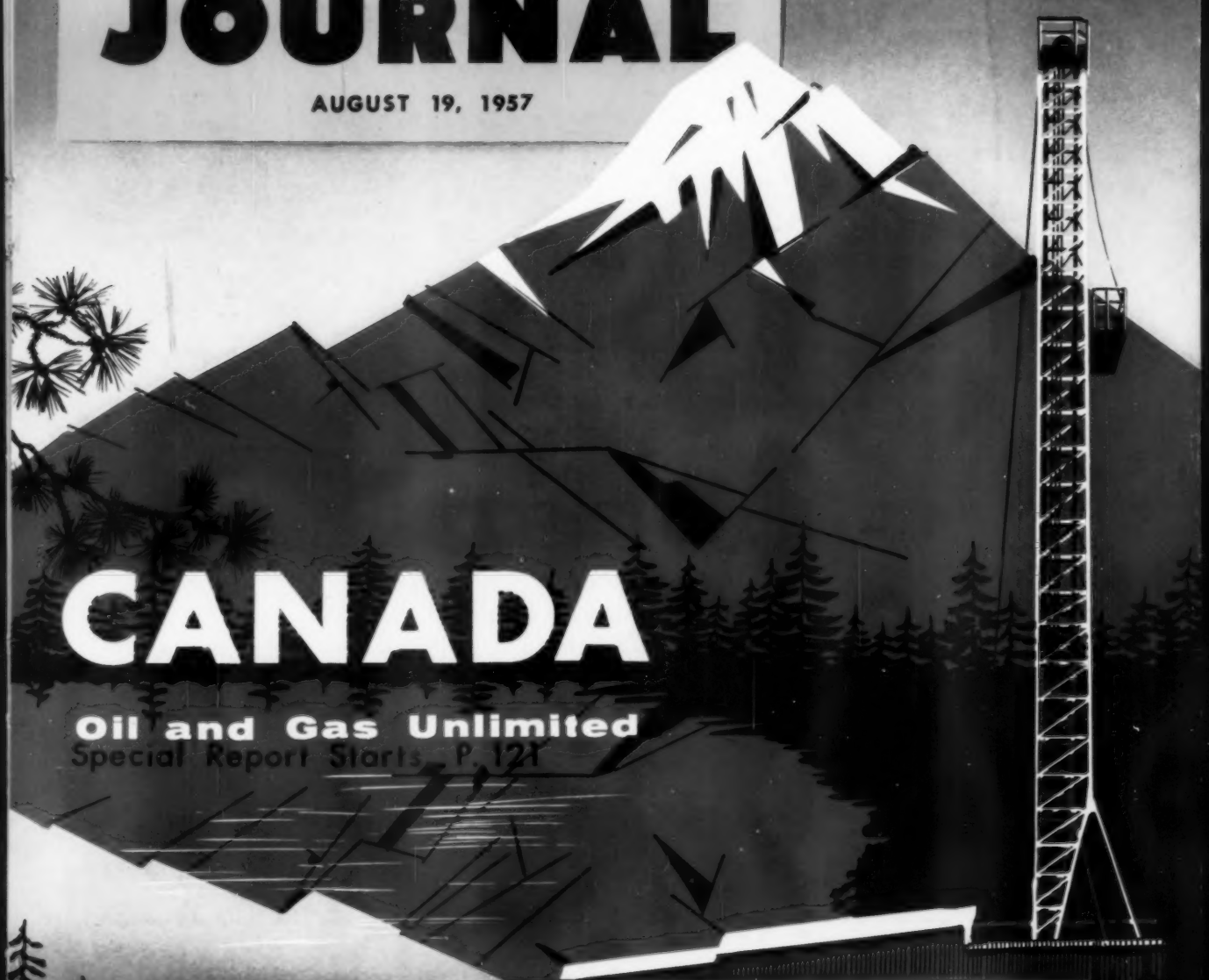
With This Issue - - - CANADIAN FORMATION EVALUATOR and STRATILOG OF MAJOR OIL AREAS

the OIL AND GAS JOURNAL

AUGUST 19, 1957



CANADA

Oil and Gas Unlimited

Special Report Starts P. 121

CITRONELLE . . .

Alabama's boom field is only two years old but is already ailing

p. 93

THE MAN BEHIND THE TRUCK . . .

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JOURNAL News Letter

Aug. 19, 1957
Tulsa, Okla.

Some strange and fancy terms will feature the next big Congressional attack on the oil industry: "Administered prices" and "costless capital".

Steel is now on the carpet before the Senate monopoly committee. Oil is among industries scheduled for the fall.

"Administered prices" means an industry where prices don't fluctuate freely with small changes in supply and demand; where most companies habitually "follow the leader".

This is alleged to be evil and inflationary, even where no conspiracy in violation of antitrust laws can be shown.

"Costless capital" refers to retaining earnings to expand capacity instead of cutting prices and borrowing new capital.

The critics' theory is that this makes consumers pay for capital improvements that enhance investors' equity, and that this is somehow antisocial and detrimental to the general welfare.

Independent refiners without marketing outlets of their own are having tough sledding this summer.

Major companies have been buying less gasoline this season than for years. Many large companies who normally purchase some product from independents have built up their own capacity to match their requirements.

On top of this is the general oversupply, which finds integrated companies cutting back their own runs.

Some small refiners are considering building up their own market outlets. But that's a rough proposition under today's conditions.

Result: A number of refineries are for sale. One company that has been looking at the field has been offered nearly 20 refineries in recent months.

Research on new catalytic processes for converting heavy refinery fractions into light products continues to bear fruit.

Look for early announcement of another one, based on hydrogenation. It's designed particularly to use excess plant hydrogen available from catalytic reforming. But even including hydrogen synthesis it's estimated to have a payout of 1 1/2 years.

Smog and fumes from auto exhaust are the fault of the engine, not the fuel -- though the public is prone to blame the oil industry.

That's the finding of Society of Automotive Engineers, which has several task forces doing research on the problem.

Best solution seems to be a catalytic after-burner on the exhaust. But most catalyists are either poisoned by lead residue or destroyed by heat.

Now S.A.E. will test a new, secret catalyst claimed to burn 75 per cent of exhaust hydrocarbons and last 12,000 miles.

Pembina's new gas-processing complex (p. 98) exemplifies a method fast gaining favor with processors -- central fractionation plant with raw, mixed products piped in from scattered field stripping units.

Goliad Corp., the Pembina operator, pioneered in this several years ago. The practice is growing fast. Today raw liquids are pipelined long distances to processing and storage centers.

Items: Bay Petroleum (Tennessee Gas Transmission) moves 10,000 bbl. per day from South Texas to near Houston. Magnolia Petroleum pipes from West Texas to Beaumont for processing. Latest entrant is Warren Petroleum, now building 40,000-bbl. plant near Houston to process mixed stream of natural-gas liquids from West Texas.

Venezuelan Government is adopting watch and wait policy toward U.S. restriction on crude imports.

Present official position is that the limitation will have little appreciable effect on that nation's economy. But if it does, Venezuela will contemplate "counter measures".

Big leasing rush is expected in Algeria.

More than 23,000 sq. miles in the central desert is now open for oil leases from the French government (p. 113). It's the 50 per cent that two lessees had to turn back on expiration of their 5-year leases.

Within the next few months much more land will be turned back for re-leasing, including areas closer to the recent big discoveries.

A freak pipeline for a freak crude is planned for Wyoming's Grieve field.

The crude has such a high pourpoint that at 40° F. it can be shoveled like dirt. So the line -- 35 miles of 8-in. -- will be operated at very high pressures to keep the oil liquid.

California's first permanent offshort platform -- as distinguished from a filled island -- will be a 100 by 100-ft. pylon type, capable of holding 25 wells.

It will be built by Humble and Standard of California 2 miles offshore from Summerland where they hold a 5,500-acre lease.

No new leasing activity in California's state-owned coastal waters is foreseeable before March. The new leasing law becomes effective September 11, and then requests that specific parcels be offered for bidding will

take 6 months to process.

Gas-up your car at the movies. That's the idea of a Texas operator of drive-in theaters. He's designing a combination service station and theater entrance. Popcorn machines are optional equipment.

A drilling rig "untouched by human hands" is the goal of a Michigan engineer-inventor.

Not an oil man, he's trying to adapt to oil-well drilling every wrinkle of automation developed in other industries to eliminate hand labor and skills.

Imagine a rig that picks up drill pipe, screws it together, feeds it down the hole, runs logs, analyzes cores, tests formations, seals off water -- and reports by television.

The inventor claims to have built such a rig on a small scale and is now working on one to go 20,000 ft. Encased in a watertight box, it could drill on the ocean bottom unattended.

He's working quietly, not trying to peddle his inventions, but apparently intends to go into the drilling business himself.

The oil industry must have a capital investment of $40,000 to $60,000 per employe. For all industry the average is $17,000.

This is a finding of First National City Bank (New York) in a study of 100 biggest U.S. corporations, including 20 oil companies.

Two new discoveries appear probable on Lake Maracaibo concessions recently obtained from Venezuela by U.S. independents.

Signal Exploration Co. and associates reportedly have 100 ft. of pay sand at 9,800 ft. in the second well on a 28,000-acre lease, and will drill ahead to the Cretaceous. This is 4 1/2 miles from first test, which may make a small producer.

San Jacinto group is 125 ft. in Lower Miocene pay below 11,000 ft. in its first well on 2,000-acre block. This offsets Mene Grande test which blew out and burned several months ago.

Two new export outlets will boost Bolivia's oil industry.

Contracts have been let to Five Lilles, a French combine, for a 500-mile crude line from southeastern Bolivia to the Paraguay River, where a small refinery will be built for the Paraguayan Government. The two governments involved will finance the line.

Bolivia also will start this year on a 201-mile, 8 and 10-in. crude line from Sicasica across the Andes to Arica on the Chilean coast.

Oil's public-relations campaign will undergo some shifts in emphasis, but probably no drastic shakeup.

Whether by coincidence or not, Adm. H.B. Miller's resignation as director of Oil Information Committee comes in the middle of a lengthy re-survey of the program's objectives and methods.

Tremendous new gas province, potentially 300 miles long, may be shaping up along Alberta's foothills belt. (p. 191 and 289).

Big strikes at Waterton and Castle River, near fabulous Pincher Creek, presage future discoveries stringing at least the 52 miles to prolific Savanna Creek field.

Proved reserves in this area already are enough to support project for big gas line into U. S. Northwest (p. 125). And exploration is barely started.

Meanwhile the same formation has just yielded big gas at Stolberg, 250 miles northwest. This makes the whole intervening stretch a most promising prospecting area.

Workovers are paying off in a big way in Oklahoma.

Summer exploration in and around old holes in various parts of the state are yielding new fields, extensions, and new pay strikes.

... Service Drilling Co. deependd an old Osage County dry wildcat in 21-23n-6e for an indicated Wilcox-Ordovician discovery.

... Anderson Pritchard got oil in Ordovician dolomite by going below an old shallow dry hole at Milroy in southern Oklahoma.

... T. P. Petroleum Co. worked over an old hole near Edmond, completed dry in the Wilcox. It tapped a new Pennsylvania lime pool.

... Ashland Oil & Refining worked over a dry hole near Clothier, made it a new-pay discovery at 150 bbl. daily.

... Jake Hamon has an indicated hit in Marshall County where a 1943 Oil Creek failure found gas-distillate in the Hunton-Misener.

... Jones Oil Co. deepened a shallow producer in Madill field, Marshall County, discovered big pay in the Third Bromide.

Wyoming drilling is at a new peak. There are 81 rotaries working, and activity is on the increase throughout the state.

Big interest is in Powder River basin ... because of recent Pennsylvanian and Parkman-Cretaceous discoveries in its northeastern section.

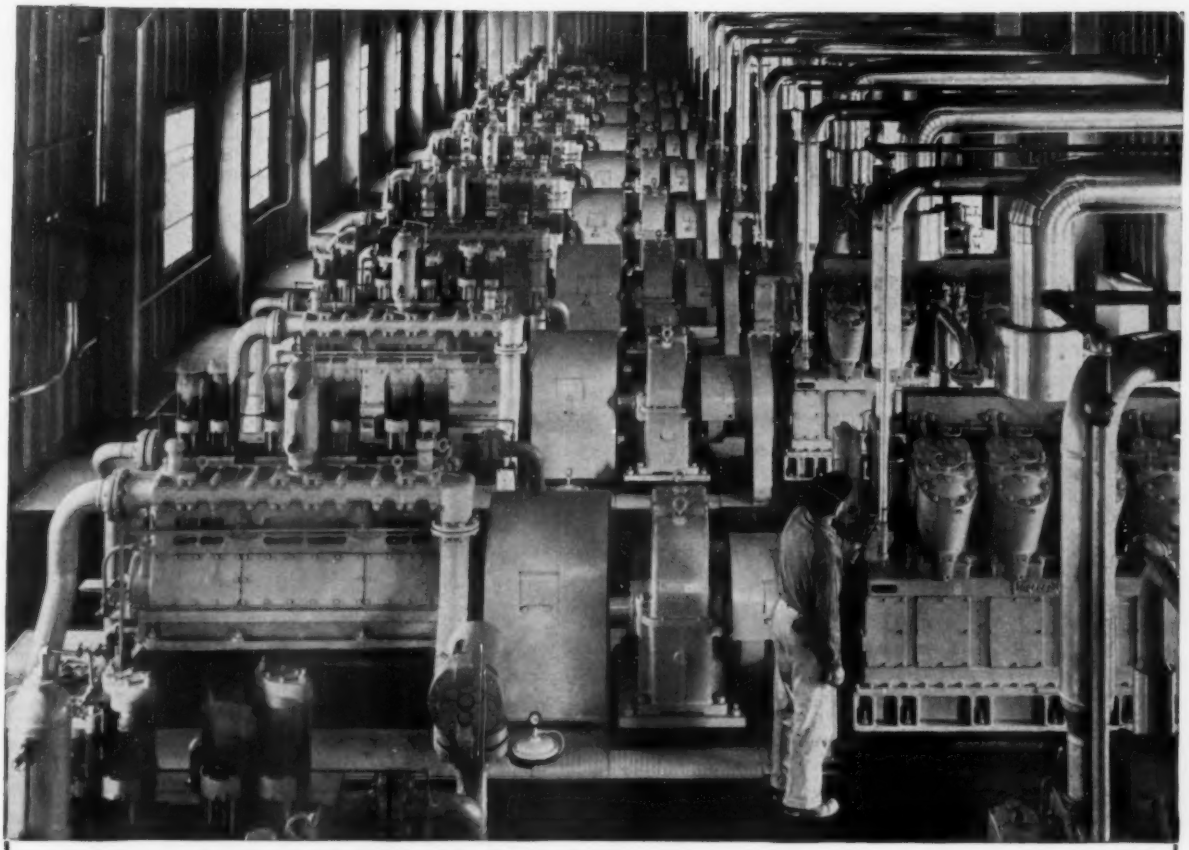
Pay zone of the year in northwest Colorado is the Weber-Pennsylvanian formation.

It produces at Rangely, the state's biggest field. But it's deeper elsewhere, and is the goal of several deep wildcats in Moffat and Rio Blanco counties.

Malco Refineries hit the Weber at 10,000 ft. for a 221-bbl. per day flowing discovery at Buck Peak field, Moffat county. Nearest Weber production is at Thornburg, 17 miles southwest.

Phillips Petroleum set a new state depth record below 17,000 ft. at Powell Park, but didn't find the Weber.

Shell Oil will drill west of White River, going to 15,000 ft. in search of this new-pay prospect.



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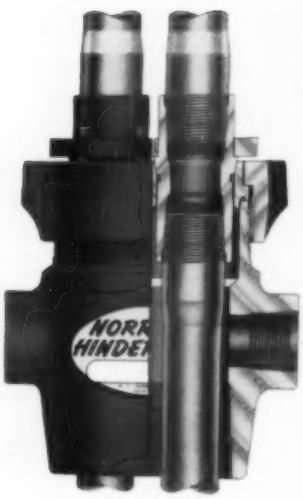

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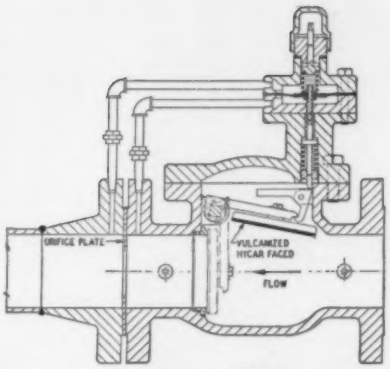

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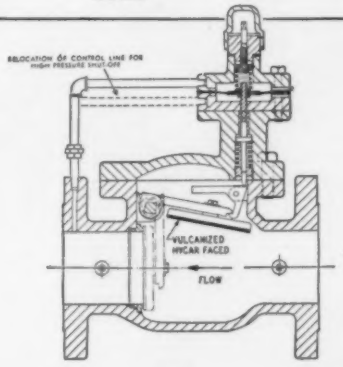

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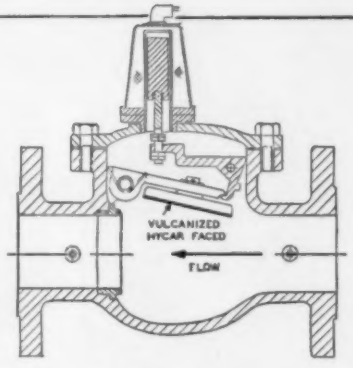

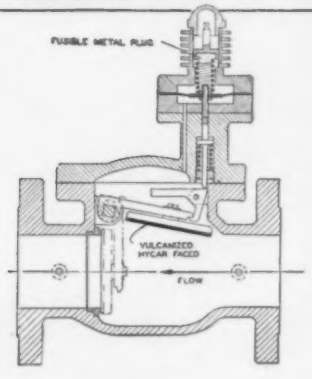

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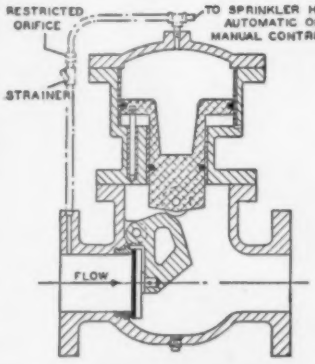

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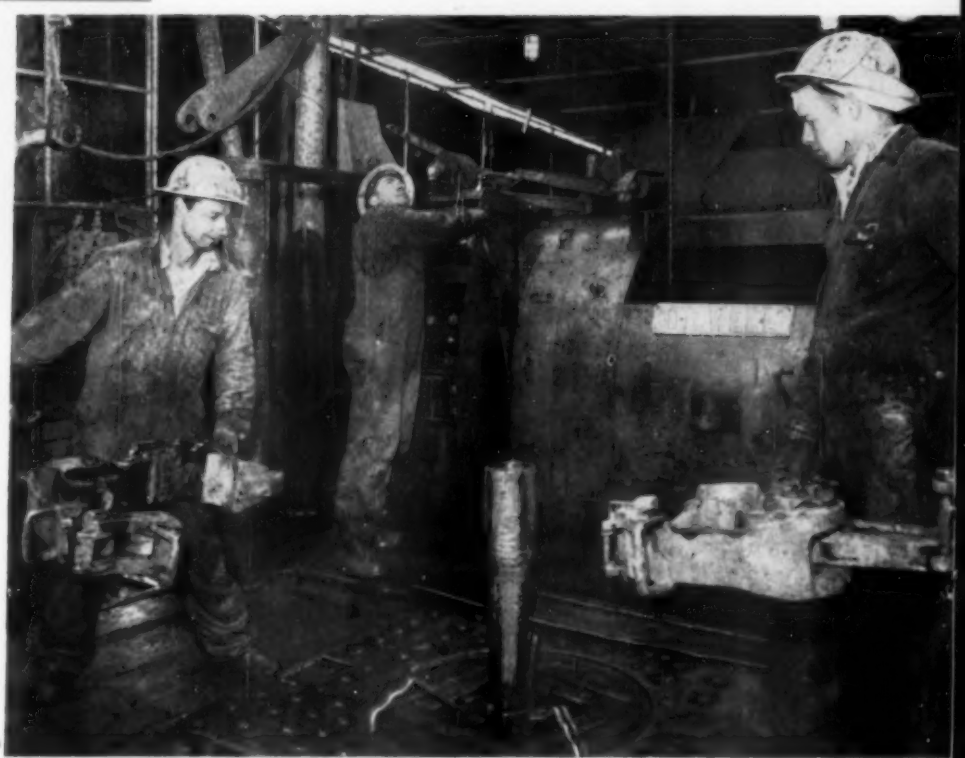

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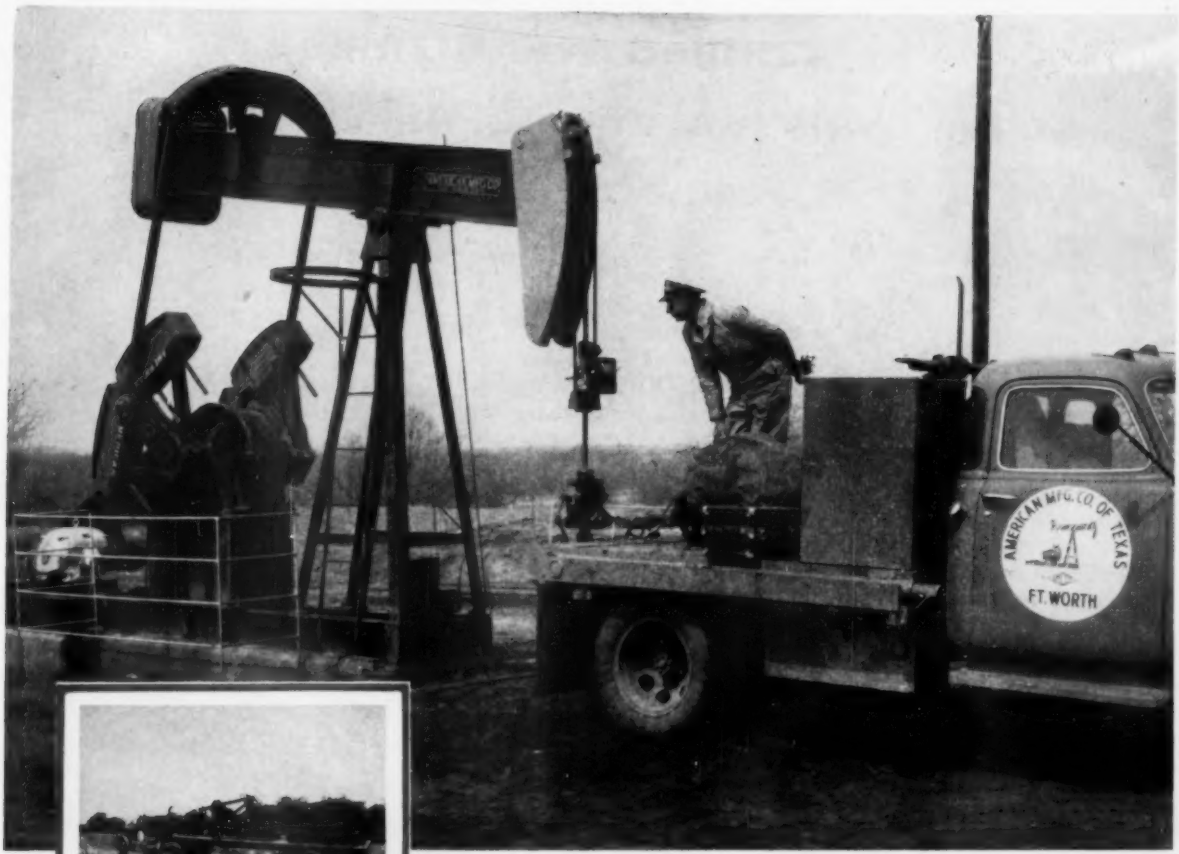

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"Red" is talking about "Catline" Dodson, a young contractor who has only one rig, so breakdowns to him are murder.

In the past 4½ years "Catline" Dodson (of Edmond, Okla.) has shifted his rig over 75 times, drilled a total of 320,000 feet so far—with the *same set* of U.S. Rainbow® V-Belts on a *compounded* mud pump drive. "It might take me up to 6 hours to replace a broken set of belts," he says, "and I figure my downtime at about $50 an hour. But U.S. Rainbow V-Belts have never failed me, not even in the near-zero temperatures. The set has so far drilled over twice the footage I'd estimated."

"Red" Royal knows many a toolpusher who will tell you Rainbow V-Belts are unbeatable for reliability. Each belt has the unique Equa-Tensil Cord Section that enables each cord to pull its full share of the load, for extra power. Your drilling dollars deliver *more* when you have "U.S." V-Belts, and other quality "U.S." oil-field products.

Available in all fields at supply stores.

Driller I. L. Dodson checking one set of U. S. Rainbow V-Belts.

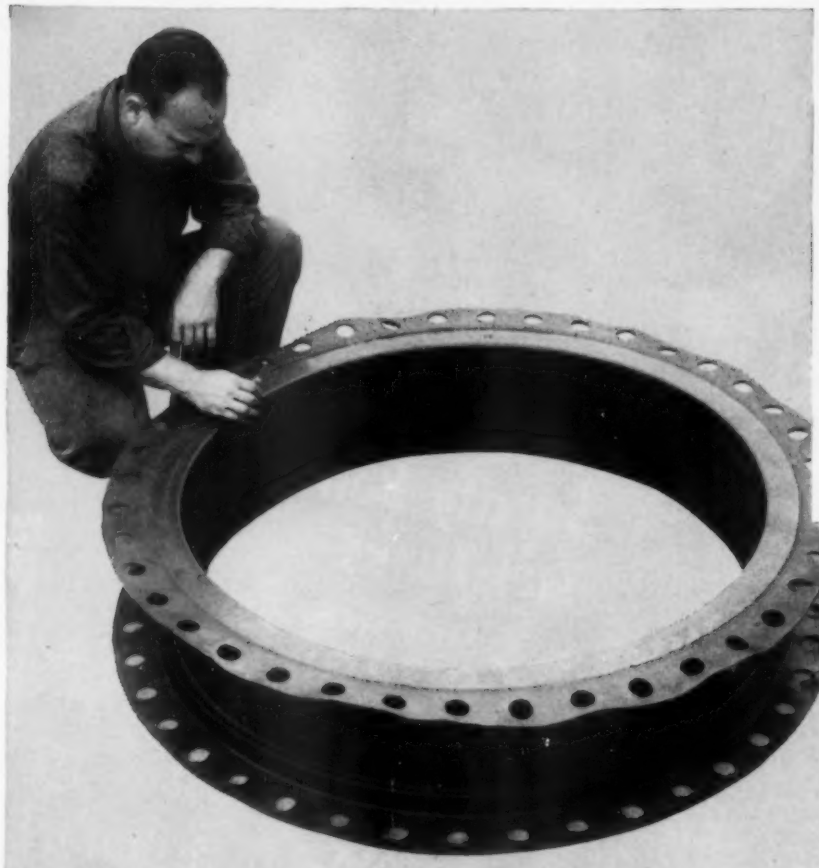
Mechanical Goods Division

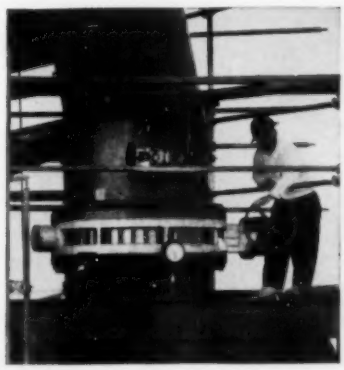
US RUBBER

United States Rubber

Another new development using

B.F.Goodrich Chemical *raw materials*





This giant Hycar *rubber valve seat was molded by Murray Rubber Company, Houston, Texas, for 44" flanged steel butterfly valve "custom-made" by Keystone Valve Corp., Houston, Texas.*

King-sized Hycar valve seat seals 44 inch butterfly

POSITIVE SEALS... without total confinement! That's what Hycar nitrile rubber provides as the seat for the 44" Keystone butterfly valve, handling steam and hydrocarbon vapors from stripper scrubber to ammonia reboiler at a South Louisiana butadiene plant.

This valve is a big brother in a new line of butterfly valves being made to help control flow of chemicals and hydrocarbons in chemical plants and refineries. It is simple, compact, reasonably priced and *dependent on its Hycar seat for efficiency.*

Because of exceptional resilience, the Hycar valve seat seals tight—withstands repeated and severe mechanical deformation from butterfly crimping when the valve is closed. And it stays resilient even though constantly exposed to steam and hydrocarbons—killers of ordinary rubber. When the valve is opened, the Hycar seat resists abrasion by the butterfly's scraping movement.

With its outstanding physical and chemical properties, Hycar may be the quick answer to your product problems.

For more details on Hycar and its uses write Dept. HB-5, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar
Reg. U.S. Pat. Off.
American Rubber

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

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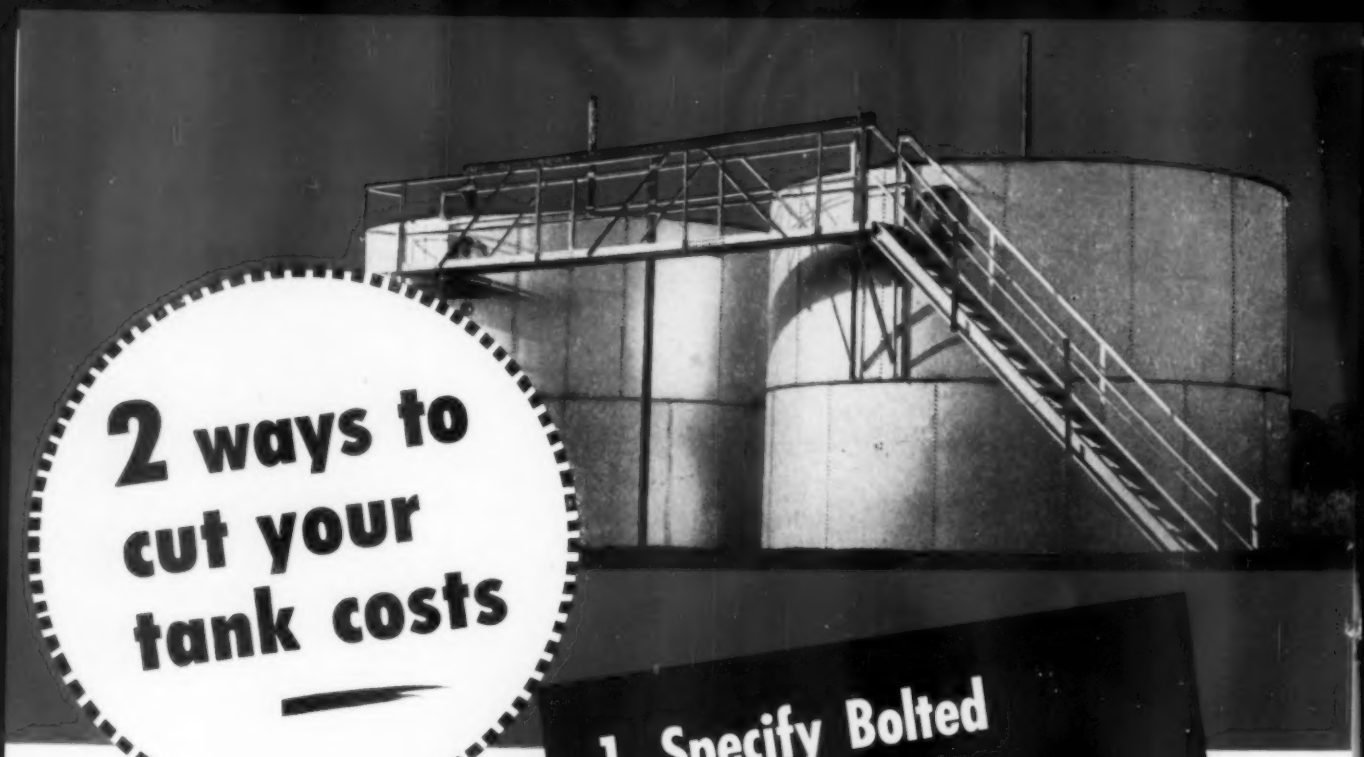
GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors



2 ways to cut your tank costs

Because Columbian Bolted Steel Tanks "fit up" better and faster, they often save substantial time-costs in tank erection. And because they are equipped with the latest in modern sealing methods, these naturally tighter tanks always cost less over the years of service.

Time lost in getting your tank to the site and into service can be costly too. You can cut this time by calling your nearest Columbian distributor, listed below. He'll have the size tank you want quickly available, where and when you want it.

1. Specify Bolted Steel Tanks

MASTER-CRAFTED BY COLUMBIAN SINCE 1893

2. Call your nearest COLUMBIAN Distributor!

COLORADO

O'Neill Tank Co.
Sterling, Colo.

KANSAS

O'Neill Tank Co.
P.O. Box 771
Great Bend, Kans.

Hays, Kans.
Hill City, Kans.
Meade, Kans.

NEBRASKA

O'Neill Tank Co.
Kimball, Neb.

LOUISIANA

McGuffin Tank Co.
P.O. Box 724
Shreveport, La.

McClatchey Tank & Supply Co.
Lafayette, La.

NEW MEXICO

Allied Supply Co.
P.O. Box 217
Artesia, N. M.

American Tank & Steel Co.
P.O. Box 1177
Farmington, N. M.

TEXAS

Gray-Brown Tank Co.
P.O. Box 924
Longview, Texas

Mapp Tank Co.
P.O. Box 1349
Odessa, Texas

Martin Tank Co.
P.O. Box 135
Corsicana, Texas
Kilgore, Texas

Federal Tank Co., Inc.
P.O. Box 3367
Bellaire, Texas

Texas Gulf Tank Co.
P.O. Box 14281
Houston, Texas

Westex Tank Co.
P.O. Box 941
Odessa, Texas

TEXAS (cont.)

Columbian Steel Tank Co.
(warehouse)
3705 McKinney Ave.
Houston, Texas

B. A. Box Tank & Supply Co.
P.O. Box 547
Beeville, Texas

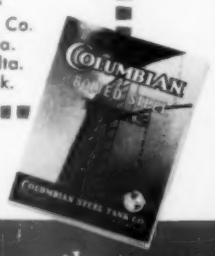
Panhandle Steel Products Co.
P.O. Box 1191
Wichita Falls, Texas

CANADA

C W S Tank Co.
Calgary, Alta.
Edmonton, Alta.
Estevan, Sask.

COLUMBIAN STEEL TANK CO.
P.O. Box 4048-J — Kansas City, Mo.

Want to know more about what makes tanks tight? Send for this most unusual handbook of valuable information and specifications. IT'S FREE!

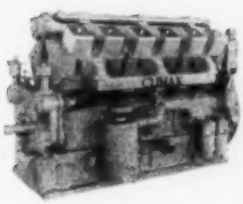


ARMS FOR THE WORLD

STEEL—Master-crafted by Columbian . . . First for Lasting Strength

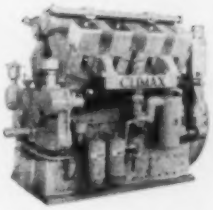
8 CLIMAX ENGINES

FOR Powering Rigs, Air and Gas Compressors, Pumps, Generators... Up to 605 H.P.



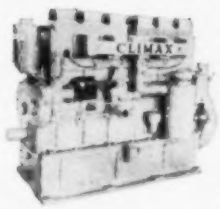
V-125—12 cylinder, 605 max. H.P. at 1200 R.P.M.

V-122—12 cylinder, 520 max. H.P. at 1200 R.P.M.



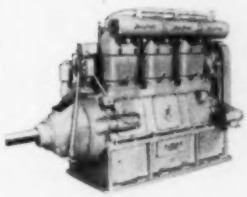
V-85—8 cylinder, 390 max. H.P. at 1200 R.P.M.

V-80—8 cylinder, 340 max. H.P. at 1200 R.P.M.



K-75—6 cylinder, 302 max. H.P. at 1200 R.P.M.

K-67—6 cylinder, 265 max. H.P. at 1200 R.P.M.



R-165—6 cylinder, 192 max. H.P. at 1200 R.P.M.

R-110—4 cylinder, 130 max. H.P. at 1200 R.P.M.

Climax Oil Field engines are well known for their rugged construction and "ability to take it" under any operating condition. These engines are made of the finest metal alloys and castings available . . . manufactured to precision standards. All models have a 7" stroke—resulting in low piston speeds . . . minimum wear . . . low maintenance . . . and long engine life.

No matter which model you choose you can be assured of extremely low fuel consumption...under constant or varying loads . . . high, medium or low R.P.M. operating conditions. All models operate efficiently on natural gas, butane or gasoline.

Your nearby Climax Distributor will recommend an engine or engines, not only to fit your present day requirements . . . but future needs as well. Each Distributor maintains complete stocks of factory guaranteed replacement parts...and well trained, experienced servicemen to answer any emergency—any hour of the day. Ask to see his many case histories and find out for yourself why Climax engines are the most "owner satisfying" prime movers in the Oil Fields.

CLIMAX ENGINE MANUFACTURING COMPANY

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HOUSTON ENGINE AND PUMP CO.
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In carrier landings, planes coming in at more than 100 knots are stopped in a split second. This amazing performance is made possible by having each plane hook onto one of several wire ropes stretched across the flight deck. Both plane and rope receive an almost unbelievable shock at the moment of contact. Needless to say, only top-quality wire ropes can be used for this application because . . .

you can't bargain with safety

While your use of wire rope differs from this carrier application, *safety should be just as important to you.* For, although a "bargain" rope may save you money, it can cost you your peace of mind. So don't bargain with safety. Buy a rope that's a *quality* rope—buy Wickwire Rope. 5049

WICKWIRE ROPE A CF&I PRODUCT

CF&I

LOOK FOR THE YELLOW TRIANGLE

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
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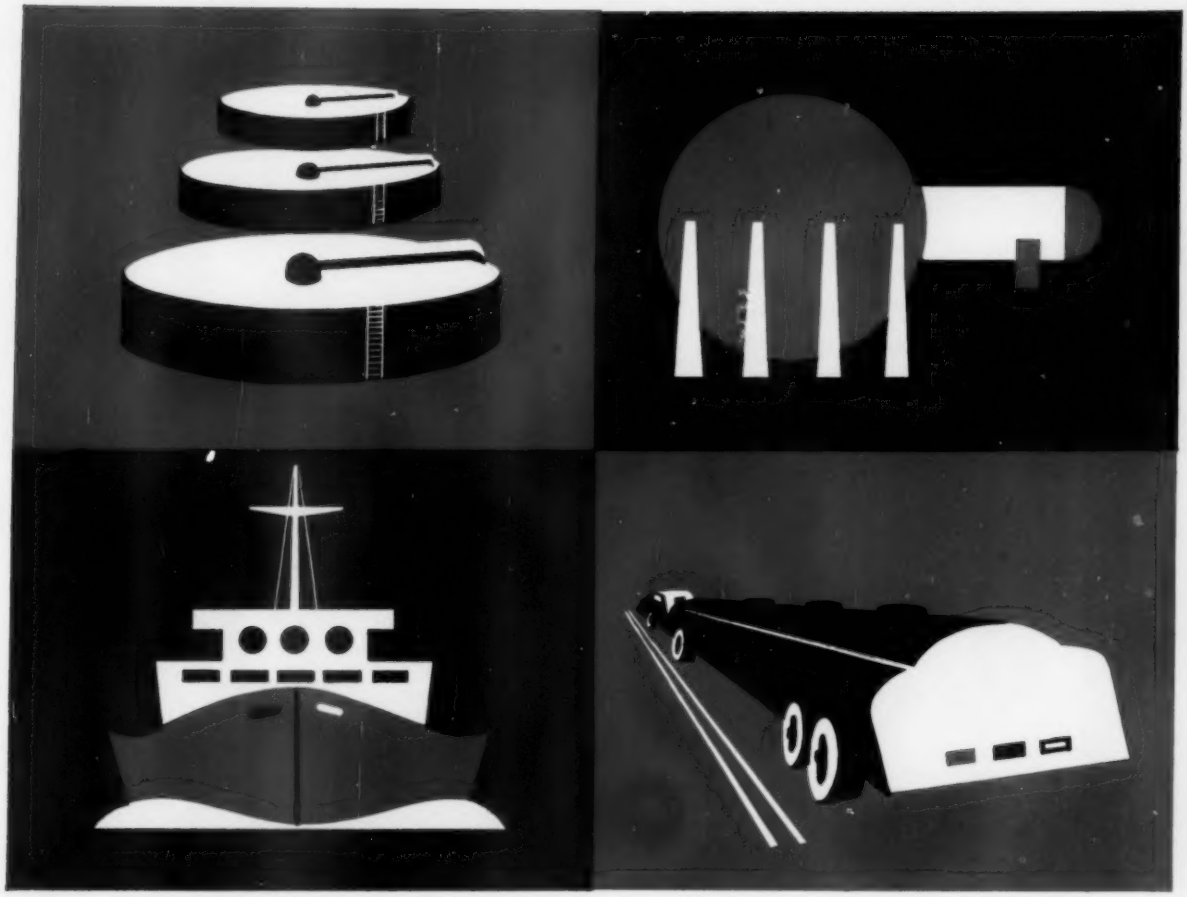
New York • Philadelphia



World's most complete line of Storage Tank Fittings

Only Shand and Jurs offers world-wide availability and service on mechanical fittings — vents, gages and valves — for storage tanks. Stocks are maintained in key cities for prompt delivery to your tank farm, yard or depot.

Proved by over 36 years service, S&J tank fittings have set the industry standard for economy, safety, accuracy and dependability. Call or write your nearest S&J office for catalog and prices on the type of fittings you need.

S&J is also a world-leader in the manufacture of electrical remote supervisory control equipment.

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4440

...your low-cost key to high octane

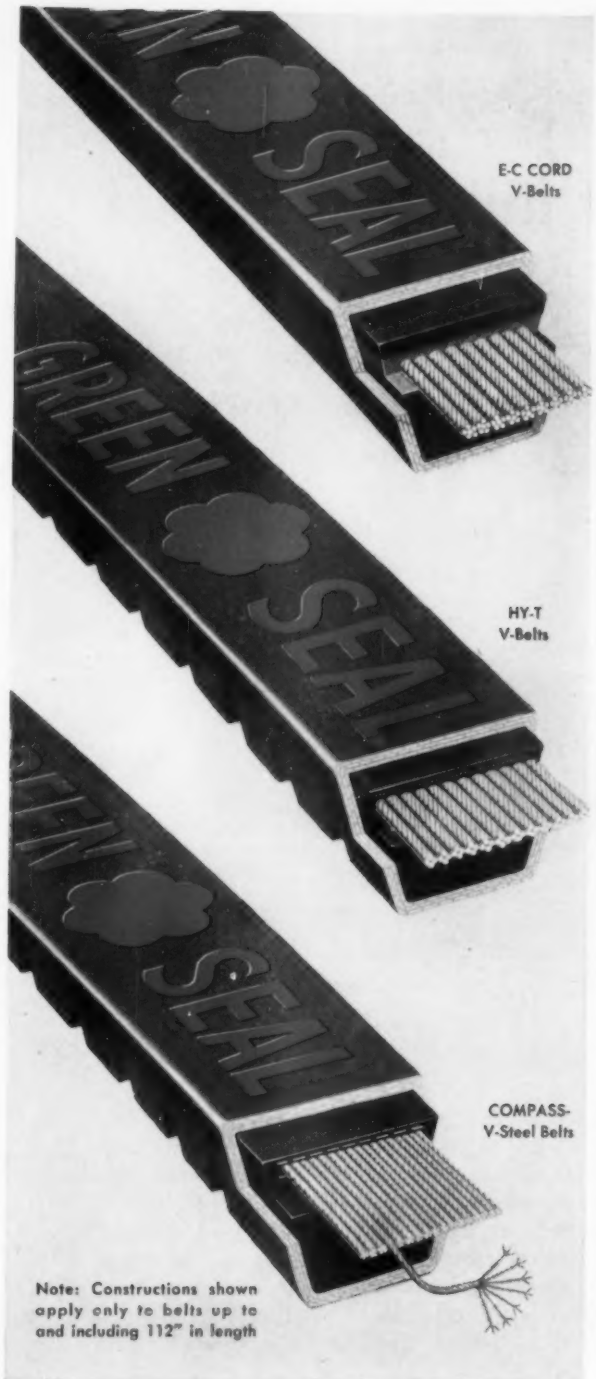
Atlantic's Catalytic Reforming Process continues to prove its ability in giving superior results on a broad variety of feed stocks. Catforming's simplicity brings savings through increased efficiency every step of the way—actually eliminating many profit-robbing intermediate steps.

Regardless of the volume of your charge stock, Catforming deserves your attention. One major reason that Catforming has "proved out" commercially is attributable to Atlantic's broad experience in all phases of petroleum refining and processing.

We invite your inquiries on Catforming. Write or wire The Atlantic Refining Company, Research and Development Dept., P.O. Box 8138, Philadelphia 1, Pa.

ATLANTIC

it's the CATALYST that counts



Why V-Belts with the Green Seal?

The Green Seal is put on each Goodyear multiple V-Belt for *your* protection. For it's your sign of a belt with dimensional stability—something long sought but only recently achieved in a complete line of V-belts.

What does dimensional stability mean to you? It means belt length remains the same from factory to drive. The length you order is the length you get. Matched sets stay matched. And mismatching – the biggest problem in belting multiple drives – is now a thing of the past.

How was this dimensional stability achieved? Until recently, stable belt length was possible only with steel cable load carriers as developed by Goodyear. But now it is also accomplished with synthetic cord through the exclusive Triple-Tempered 3-T process that stabilizes length by careful tempering with Tension, Temperature and Time.

Triple-Tempering also gives you a stronger, more shock- and stretch-resistant belt. Add "balanced construction" – with each component of the belt designed to its job—and you have a smoother-, longer-running belt which means maximum, trouble-free horsepower hours at minimum cost.

DIMENSIONALLY STABLE V-BELTS
with the GREEN SEAL by

GOODYEAR

THE GREATEST NAME IN RUBBER

The Goodyear Tire & Rubber Company, Dept. 794, Akron 16, Ohio

Please send me more information about how V-Belts with the Green Seal solve the major problem in belting multiple V-belt drives.

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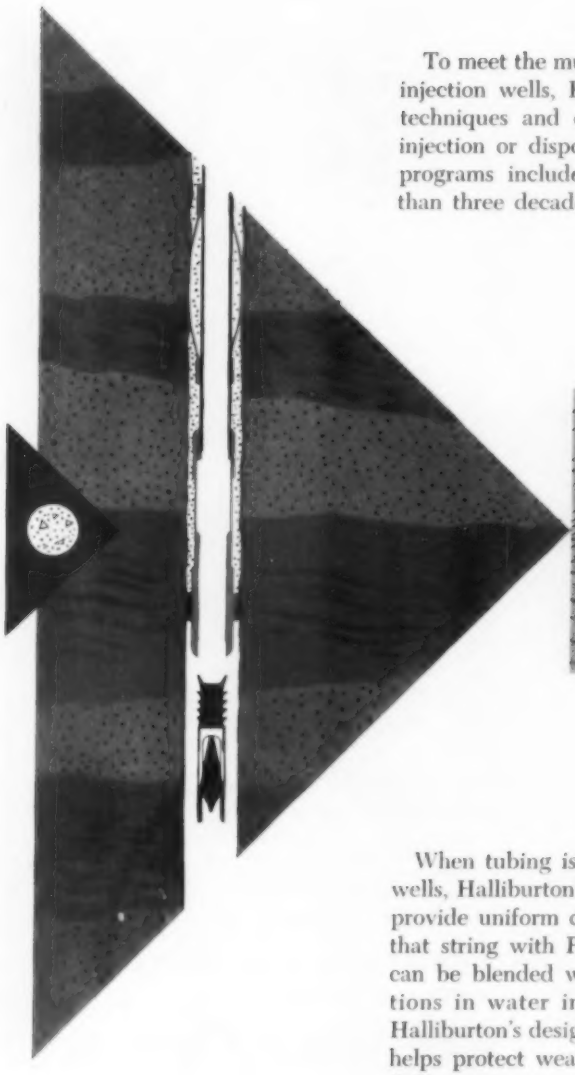
Company_____

Street Address_____

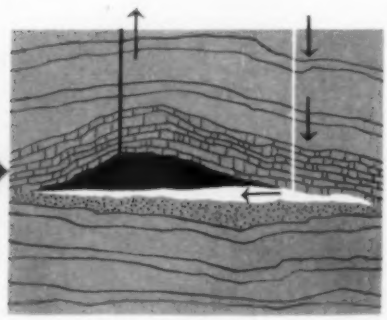
City_____ Zone_____ State_____

Compass, E-C Cord, Hy-T, Green Seal–T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

WHY HALLIBURTON CEMENTING IS BEST FOR water injection wells!



To meet the mushrooming growth of waterflooding and water injection wells, Halliburton has developed specific cementing techniques and companion products. Successful operation of injection or disposal wells in primary and secondary recovery programs includes Halliburton cementing... backed by more than three decades of oil well services.



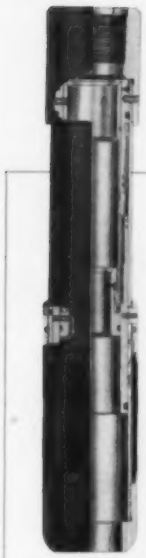
When tubing is used as production string in water injection wells, Halliburton's specially designed Tubing Centralizers help provide uniform cementing... plus more durable protection of that string with Pozmix Cements. A wide variety of additives can be blended with Pozmix Cements to meet specific conditions in water injection wells. Newest development from Halliburton's design boards is the Full-Flow Packer Shoe, which helps protect weak formations... and is designed to eliminate drill-out time.

For the most advanced services... call the world's most experienced oil well cementing company.

HALLIBURTON
OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

BETTER TOOLS TO DO A BETTER JOB

NEW FULL-FLOW PACKER SHOE designed to eliminate cement drill-out



New Full-Flow Packer Shoe

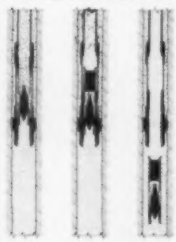


Fig. 1 Fig. 2 Fig. 3

Fig. 1 — Ports open, displacing cement.

Fig. 2 — Cement in place, closing plug seated closing ports.

Fig. 3 — Plug, seats and bomb discharged out of shoe.

... A packer-type cementing shoe to help protect the formation below while cementing tubing or casing in new or old cased or uncased wells. No internal parts remain in the string to be drilled out after cementing. Seats and cementing plugs are discharged out of the bottom of the shoe into the open hole.

- For protection of weak formation while cementing tubing or casing in oil, gas or water injection wells.
- For fracture or treatment of old wells to improve production ... the tubing or casing is first cemented, then well is fractured.
- For plugging back or killing wells having excessive bottom pressure. Packer is set and cemented in regular manner, with tubing left open for pressure to escape until cementing material has set. Then, well is squeezed, tubing is backed off and well is killed.
- For wells where Halliburton Formation Packer Shoe cannot be used because formation water pressure below packer is greater than hydrostatic head of cement around the outside of the casing.

TUBING CENTRALIZERS

... are used on tubing strings in deep wells to help protect tubing and collars against wear when the string is frequently pulled and then re-run. In some areas, tubing is used as production string and for water injection wells; centralizers give better centering in the bore hole and allow for better placement of cement around the tubing string. Tubing centralizers are also used on strings for protection of flow valves (gas lift).

Tubing Centralizer

Pozmix Cement

HALLIBURTON POZMIX CEMENT

... is a blend of pozzolanic materials and portland cement, with desirable characteristics that cannot be obtained with neat portland slurries. Such features as resistance to corrosive well fluids, improved perforating qualities and reduced gelling action during displacement make Halliburton Pozmix Cement superior to portland cement for many applications.

HALLIBURTON BULK CEMENT ACCELERATORS

... Calcium Chloride adds to the early compressive strength of cement, reduces W. O. C. time, and is an effective "accelerator" for all types of cementing compositions.

... Diacel A is used with Diacel D cement to accelerate the set where low water loss additive is used in primary and remedial cementing at low temperatures.

A Halliburton Field Service Representative is available to help you plan any cementing job.

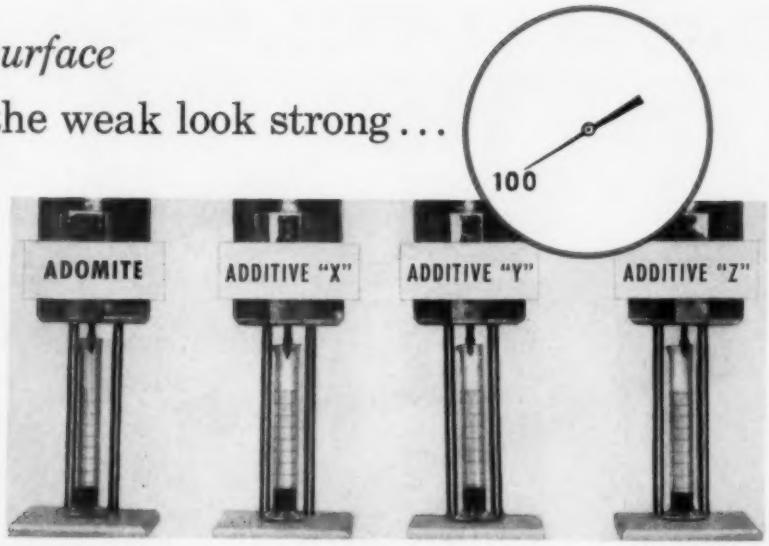
CEMENTING SERVICES

"A WELL WORTH CEMENTING IS WORTH CEMENTING WELL"

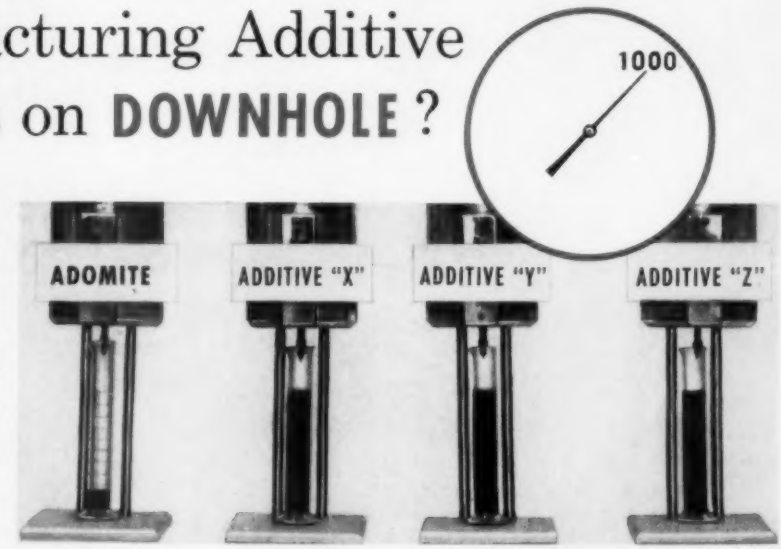
winterizing...
is a Stearns-Roger specialty
Every "cold country" plant designed and built by Stearns-Roger provides efficient, economical operation with the necessary protection for operators and equipment. The experience of more than 25 years goes into every cold climate plant... design, engineering, procurement, fabrication, field erection. Your project requires just one point of contact — one order.
Complete process plant or enlargement, large or small...
take it up with
Stearns-Roger
THE STEARNS-ROGER MFG. CO. • DENVER, COLORADO
DENVER • HOUSTON • EL PASO • SALT LAKE CITY
Stearns-Roger Engineering Co., Ltd., Calgary

On the surface

even the weak look strong . . .



but which Fracturing Additive can you count on **DOWNHOLE**?



Some fluid loss control additives act impressively at surface conditions of low pressure and room temperature. But downhole, they let you down . . . with fluid loss becoming so high that their effectiveness is lost. That's what distinguishes Adomite from other fluid loss control additives. You can count on Adomite for *deep-down* effectiveness.

What's the secret of Adomite's *deep-down* effectiveness? Adomite, when mixed with oil, disintegrates into millions of tiny particles. These particles seal the face of the formation and keep the fracturing fluid from filtering in. Temporarily sealing the formation, Adomite particles do not plug it.

Where do other additives fail? These likewise contain sealing particles, but tend to soften or dissolve as temperatures increase. Consequently, fluid loss control is greatly reduced.

To be sure of least fluid loss, tell your service company to fracture with Adomite.

	Fluid Loss at Surface Conditions— 100 psi,* 75°F., cc/30 min.	Fluid Loss at Bottom Hole Conditions— 1000 psi, 150°F., cc/30 min.
Adomite plus crude oil	2.2	22.0
Additive X plus crude oil	37.8	Infinite
Additive Y plus crude oil	8.5	Infinite
Additive Z plus crude oil	13.0	295 (1 min., 50 sec.)

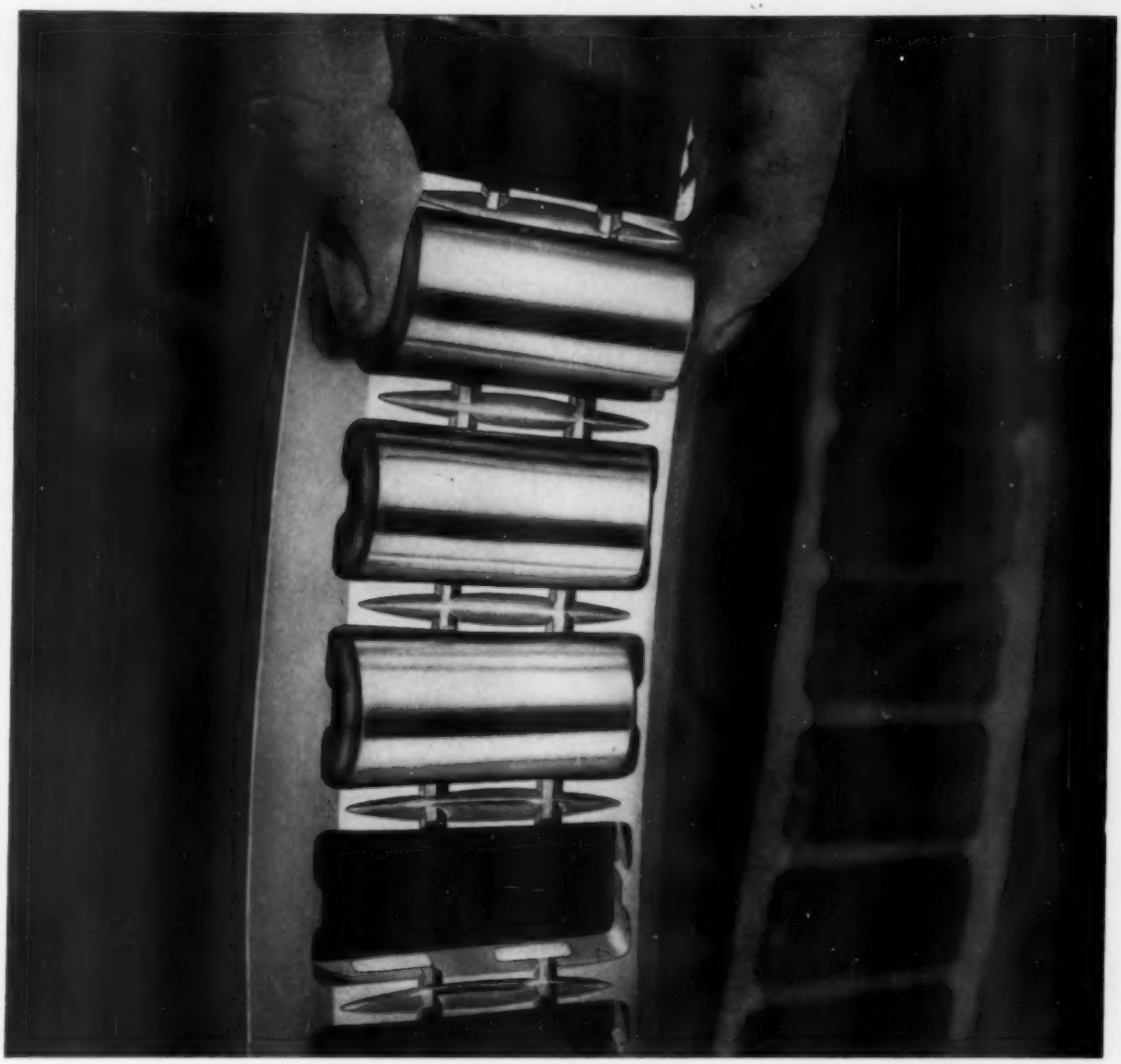
* Standard API Code 29 Test

fracture with

Adomite®

© 1957, Continental Oil Company

TORRINGTON *TAPERED ROLLER* BEARINGS



Accurately caged . . . to cut your costs!

The one-piece, cast-bronze cage you see above is one of the reasons why TORRINGTON Roller Bearings give long, low-cost service. Note the individual roller retainment, for example. This helps keep the rollers thoroughly lubricated at all times. Race surface inspection is simplified. The machined pads in each roller pocket make sure the rollers are guided accurately at the pitch line. All this to minimize wear . . . lengthen bearing life.

Yes, TORRINGTON Roller Bearings cut your costs. They're made of the finest bearing quality steel available, heat treated by the most modern methods. No wonder they're so rugged . . . so dependable. Specify TORRINGTON *Tapered* or *Cylindrical* Roller Bearings for heavy loads and low maintenance.

THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.
District offices and distributors in principal cities of United States and Canada

TORRINGTON BEARINGS

Spherical Roller • Tapered Roller • Cylindrical Roller
Needle • Ball • Needle Rollers

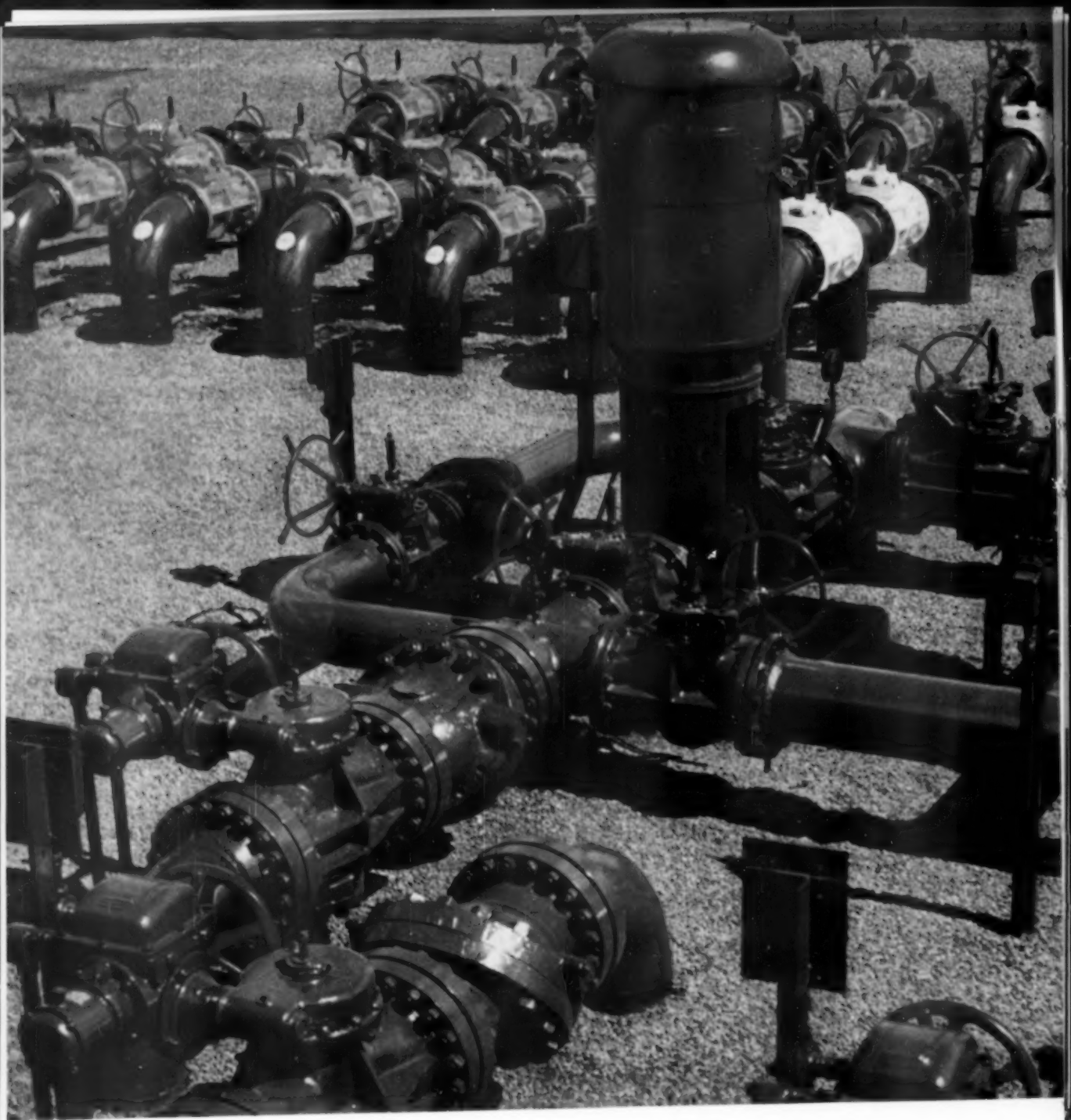
TROUBLE FREE... You can't buy a more trouble-free, leak-proof valve than Rockwell-Nordstrom; that has been proven over the last 40 years. The basic reasons: a durable, *pressurized lubricant* seal holds the lightest gases or heaviest slurries bottle tight. And, *lubricant protection* eliminates metal-to-metal wear —prevents valve failure, keeps maintenance costs lower than any other valve.

Rockwell-Nordstrom, the world's most complete line of lubricated plug valves, will give you better flow control at lower cost everywhere you use them. And they cost no more to buy, often less, than ordinary valves. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Available at leading suppliers . . . everywhere.

ROCKWELL-
Nordstrom
VALVES

Lubricant Sealed For Positive Shut-Off



RUGGED Rockwell-Nordstrom valves *stay* trouble-free on pump and compressor lines. Why? Their firmly seated, lubricated plug prevents seat failures that are common to ordinary valves on high pressure or pulsating flow. And even on hard to handle services, shut-off is always positive because a tough film of lubricant forms an instantly replaceable, double seal against leakage.

Rockwell-Nordstrom is the original and world's most complete line of lubricated plug valves and lubricated plug valve accessories. They cost no more to buy, often less, than ordinary valves and they'll save money, give better performance everywhere you use them. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Available at leading suppliers . . . everywhere.

ROCKWELL-
Nordstrom
VALVES

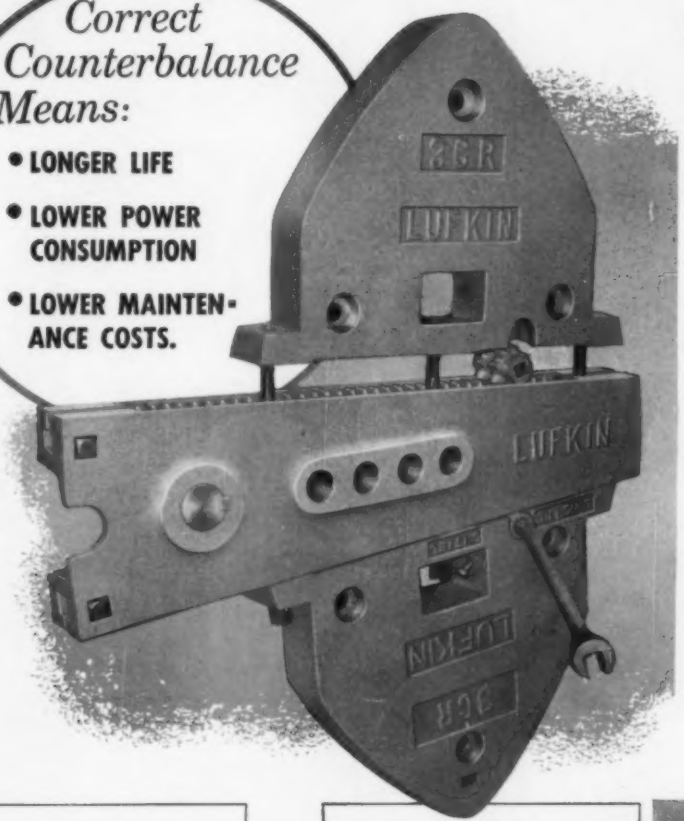
Lubricant Sealed For Positive Shut-Off

Correct Counterbalance is Essential to the Life and Performance of your Unit!

the LUFKIN-TROUT Crank

Correct Counterbalance Means:

- **LONGER LIFE**
- **LOWER POWER CONSUMPTION**
- **LOWER MAINTENANCE COSTS.**



Makes Counterbalance Adjustment Simple and Easy

1. Move cranks to horizontal position and set brake.
2. Loosen nuts holding counterweight using wrench as furnished and sledge hammer.
3. Loosen set screw with ordinary crescent wrench.
4. Insert square on wrench handle into socket in end of pinion and rotate, moving counterweight to desired position.
5. Tighten nuts on counterweight bolts, using wrench and sledge.
6. Tighten set screw.

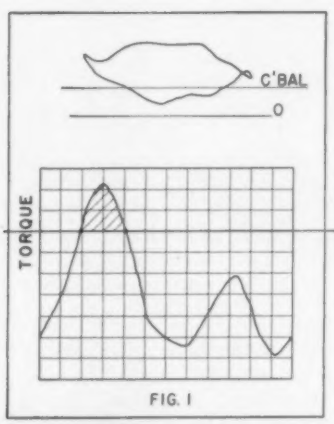


FIG. 1

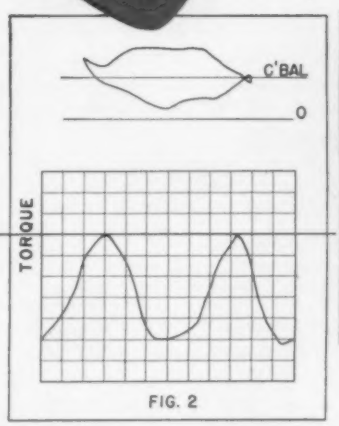


FIG. 2

FIGURE 1. Illustrates the results of incorrect counterbalance. Note peak torque on up stroke exceeds rating of gears.

FIGURE 2. Torque curve on same well shows how proper counterbalance evens out the peaks and reduces peak torque to within gear rating.

- Lufkin Gears, when operated within their rated capacity, will give many years of trouble free service.

Lufkin FOUNDRY & MACHINE COMPANY

LUFKIN, TEXAS

Branch Sales and Service: Houston • Natchez • Corpus Christi • Lafayette • Dallas • El Dorado • Kilgore • Odessa • Hobbs Midland • Pampa • Wichita Falls • Los Angeles • Bakersfield • Effingham • Casper • Denver • Sidney • Great Bend Oklahoma City • Seminole • Tulsa • New York • Maracaibo, Venezuela

Lufkin equipment in Canada is handled by
THE LUFKIN MACHINE CO., LTD., 9950 65th Avenue, Edmonton, Alberta, Canada, Regina, Saskatchewan, Canada

ARE YOU SETTING UP TO HANDLE ETHANOLAMINES?

The lower costs and easier handling that result from bulk purchasing are encouraging many ethanolamines users to install bulk facilities. The checklist below lists the important installation factors, and Jefferson's bulletin on Ethanolamines* covers handling and storage information in considerable detail.

But there's an easy way to evalute the economies of bulk purchasing . . . and to plan a suitable handling system. Just call in your Jefferson representative and let him do it for you.

Send for your copy today!

ETHANOLAMINES

. . . solidify at or slightly below room temperature. They will darken on exposure to air, and are hygroscopic. Iron and its oxides are relatively inert to ethanolamines, but copper and its alloys react to form complex salts.

Recommended are:

- Carbon steel storage tanks
- Heating coils of stainless steel
- Transfer lines at least 2" in diameter
- Pumps with all-iron parts

Color restrictions or temperature conditions may require:

- Nitrogen gas padding in storage
- Insulation of tanks
- Steam tracing of transfer lines

If used in aqueous solution, dilution in storage will lower the freezing point and reduce the viscosity.

Quick service on mono-, di- or triethanolamine is available from Jefferson's conveniently located stock points. **Jefferson Chemical Company, Inc., 1121 Walker Ave., Houston 2, Texas**

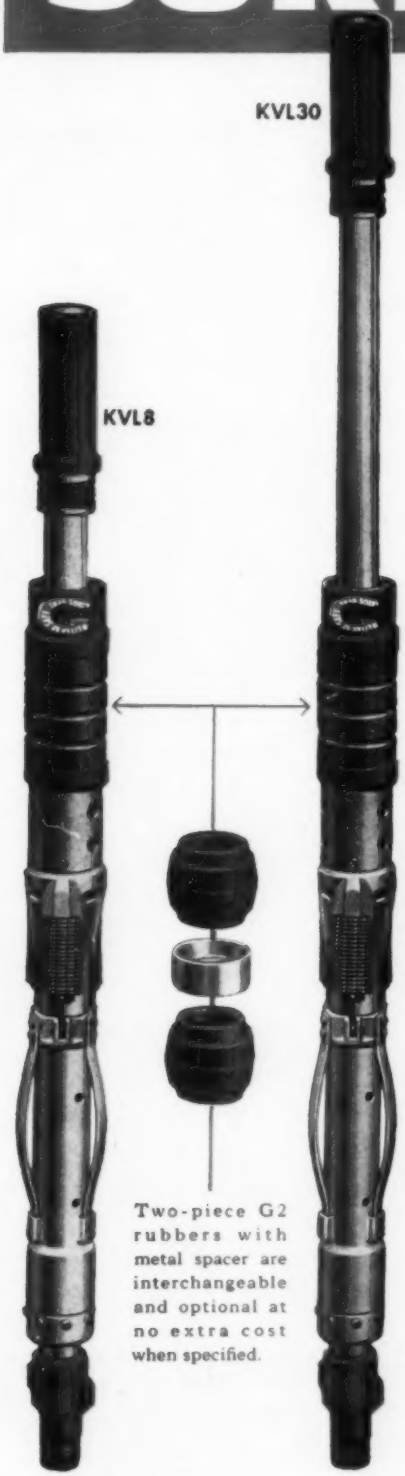
Essential Chemicals from Hydrocarbon Sources

Jefferson CHEMICAL COMPANY, INC.

HOUSTON • NEW YORK • CHICAGO • CLEVELAND • CHARLOTTE • LOS ANGELES

SAFE and SURE

GUIBERSON'S KVL PACKERS



Two-piece G2 rubbers with metal spacer are interchangeable and optional at no extra cost when specified.

With Automatic Latch

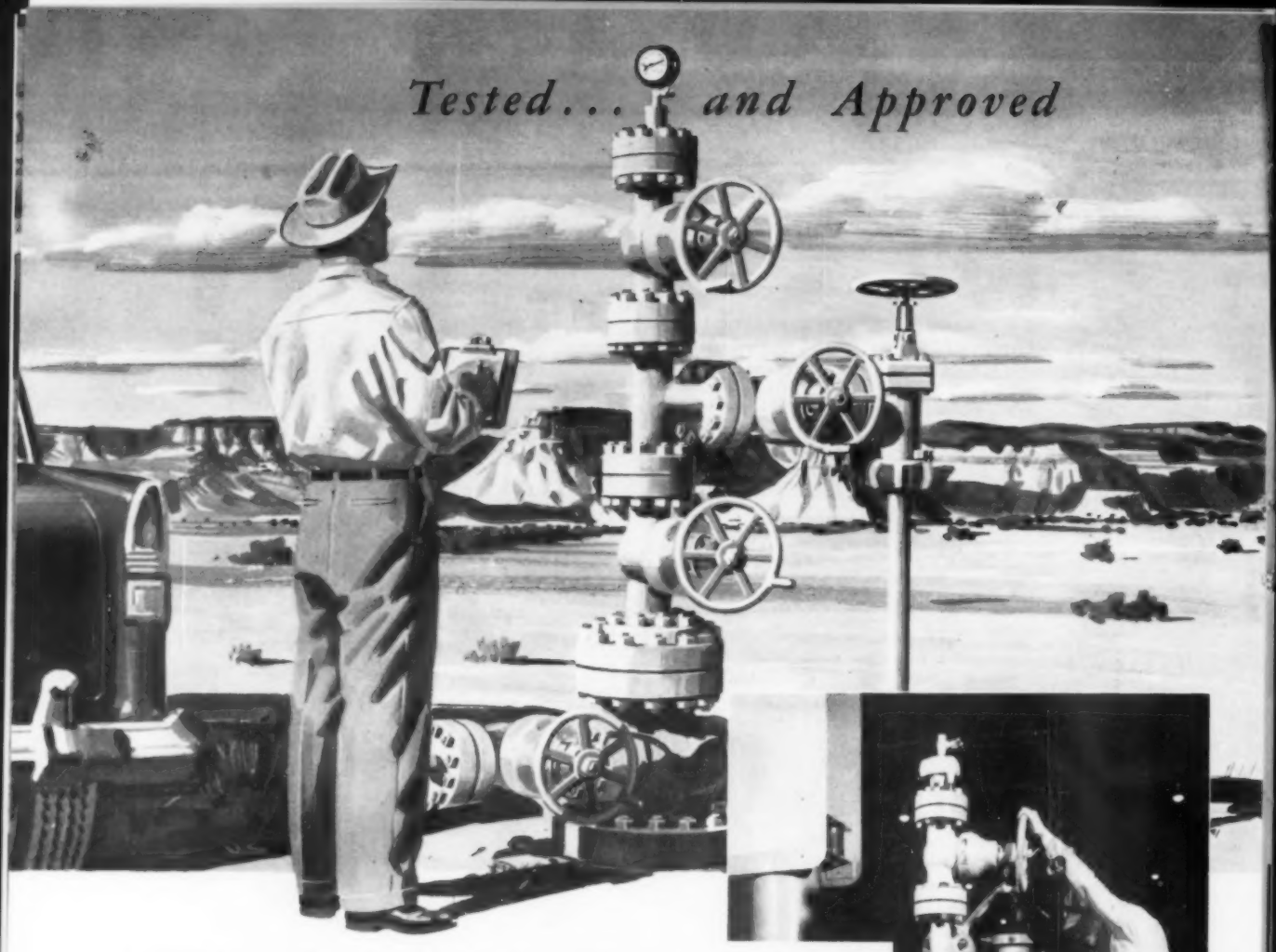
Operators who want extra assurance that a packer won't come unlatched going in, depend on Guiberson KVL packers. Rugged and durable, KVL packers have earned a reputation for dependable performance in deep and medium depth wells. These retrievable packers are easy to set and release, with ample bypass and positive seal. When running into a liner the KVL stays latched and drag springs provide an excellent guide — features operators like. For conserving gas energy and increasing production in flowing wells; for completing wells by circulation; for acidizing, repressuring and dozens of other uses, the KVL is unsurpassed.

- Made as the KVL30 with 30″ valve stroke or KVL8 with 8″ valve stroke for standard below-packer circulation. (Both packers also made with perforated mandrel for circulation above packer.) Available in casing sizes 5″ through 9⅝″.
- Valve has two independent sealing elements, a tapered metal valve and seat and a set of oil-resistant seal rings, affording double-sealed protection.
- Rubbers made of special oil and gas resistant compound. Will not vulcanize to casing — recover original shape when released.

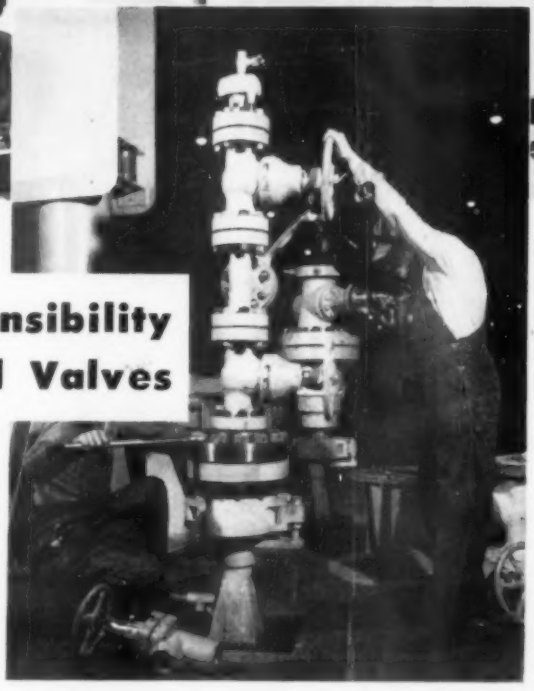
THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

Sold by Oil Field Supply Stores Everywhere



One Manufacturer–One Responsibility
BIW Well Head Assembly and Valves



The entire BIW Completion Manifold is built and tested at ALCO'S Beaumont plant. Well heads, hangers, seals, the BIW non-lubricated gate valve, adjustable and positive flow controls, all are part of the complete tree designed and tested for your specific needs. The tradition and skill which back up BIW equipment go back fifty years and have been proved on thousands of wells.

Now with the resources and manufacturing experience of ALCO, you can expect BIW to be the best in safe, easy to operate, and long-lasting well head equipment. You get the craftsmanship and oil country know-how of BIW, plus the modern manufacturing techniques of ALCO.

An ALCO specialist is available to show you how the complete BIW tree and the BIW non-lubricated gate valve match up to more than meet your specifications. Or write ALCO Products, Inc., Petroleum Industry Equipment Division, Dept. BV-4, Bank of the Southwest Building, Houston, Texas.

ALCO

ALCO PRODUCTS, INC.

NEW YORK

Sales Offices in Principal Cities

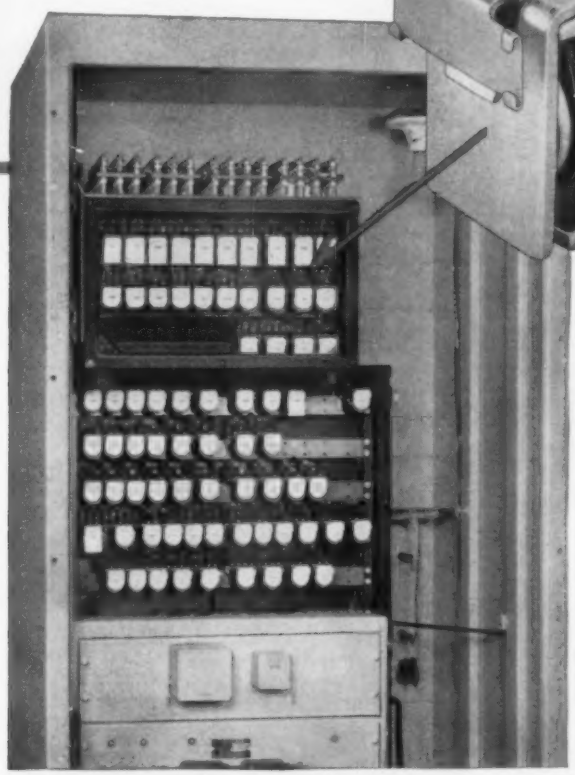
Locomotives · Diesel Engines · Nuclear Reactors · Heat Exchangers · Springs · Steel Pipe · Forgings · Weldments · Oil-Field Equipment

UNION C.T.C. —the pipeline control system with BUILT-IN RELIABILITY

4,000,000 operations a year.

This is regular performance for this L-Type UNION Relay used in the coding unit which transmits and receives all codes. Relays have bifurcated contacts, self-wiping action and chromium plating at the wear points to assure maximum reliability. Coil and contact assemblies are designed to withstand 3000-volt breakdown test.

UNION L-Type Relay



UNION Centralized Transport Control Equipment for the central office (back view) uses plug-connected units for ease of handling.

RELAYS are the key to reliability in Centralized Transport Control Systems—and UNION has been building top-quality relays for more than 75 years.

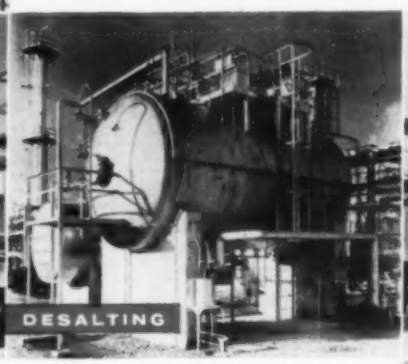
Here's the proof of outstanding performance: 443 UNION relay coding units, the kind used in railroad and pipeline C.T.C. Systems, were brought into the shop for cleaning and repairs. These had been in service without maintenance from one to 10 years. *For 65% of the units, no repairs were required*—only cleaning and adjustment. 10% required slight repairs on the relay contacts. The remaining 25% had been damaged by lightning. The relays in these units averaged about four million operations a year.

This is an example of the reliability that is built into the components used in a UNION C.T.C. System. It means that you can expect a UNION System to go to work and keep on working with the least possible maintenance cost. Write for a copy of our Bulletin 1052.

Quality First...TO LAST

UNION SWITCH & SIGNAL
DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY
PITTSBURGH 18, PENNSYLVANIA

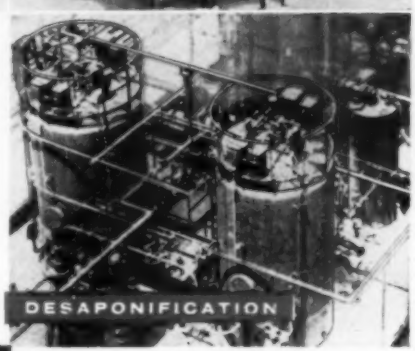
PETRECO electric processes are contributing to the AUTOMATIC CONTROL of petroleum producing and refining operations

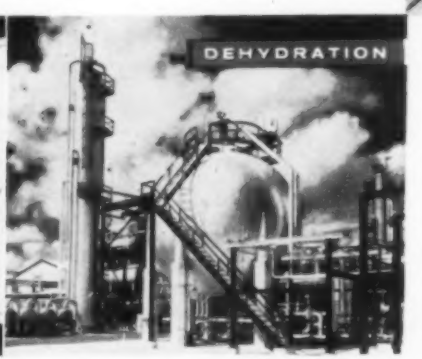


Throughout the world, Petreco electric processes are eliminating the many problems and uncertainties that used to grow out of processing guesswork.

By incorporating the advantages of automation, Petreco units are changing many a processing "art" to an exacting *science*.

Petreco designs, constructs and services electric petroleum treating equipment to perform many processing functions—automatically, continuously and with precision control.





For complete information on any or all of these processes:

- ELECTROFINING
- SWEETENING
- DESALTING
- LUBE OIL TREATING
- DESAPONIFICATION
- SEDIMENT SEPARATION
- DEHYDRATION

WRITE OR CALL

PETRECO®

A DIVISION OF PETROLITE CORPORATION

3202 S. Wayside Drive, Houston 1, Texas • 1390 East Burnett St., Long Beach 7, California

Specialized Electric Petroleum Treating

DESALTING • DEHYDRATING • CAUSTIC WASHING • ACID TREATING • DOCTOR TREATING
SWEETENING • NAPHTHENIC ACID REMOVAL • SEDIMENT REMOVAL

AP-57-1

You gain **UNEQUALLED** benefits when Mud-Sol is used to clean up your well...

...to remove a mud block

...to improve production

...to increase the effectiveness of acidizing or hydraulic fracturing treatments

...to insure better bonding of the cement in casing cementing or squeeze-cementing operations

Mud-Sol service offers you *three* distinct mud removal fluids. Acid content and formulation of each is based on specific well bore and formation cleaning conditions.

Mud-Sol's well-balanced formulae prevent the formation of pore-plugging gelatinous compounds and emulsions...keep undissolved solids dispersed and suspended until the treatment residue is removed from the formation.

You will be money ahead when you insist on Mud-Sol treatment in preference to any other mud-removing method.

ASK your nearest BJ Service-Chemical Process station for full details TODAY.

CHEMICAL PROCESS BJ Service

SUBSIDIARY OF BORG-WARNER CORP.

BJ SERVICE, INC.

General Offices and Laboratory — Long Beach, California

Stations Throughout California, Rocky Mountain and Permian Basin Areas

Chemical Process

General Offices and Laboratory — Breckenridge, Texas

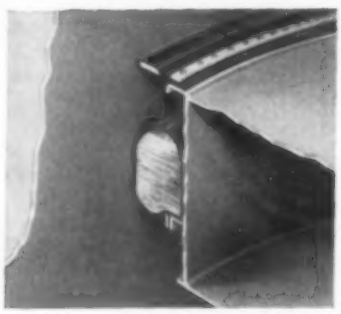
Stations Throughout the Mid-Continent Area

every oil operator wants to know

HOW TO PREVENT LIGHTNING FIRES IN TANKS

the answer is now available

USE HAMMOND TUBESEAL* FLOATING ROOFS!

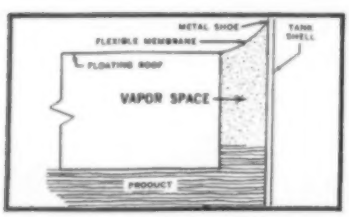


TUBESEALS are made lightning-proof with their exclusive electric conductor weather seal.[1] This specially compounded synthetic rubber, extending continuously around the entire perimeter, between roof and tank shell, provides an infinite number of contact points. ELABORATE TESTING by an independent laboratory[2] discloses that the seal prevents isolation and collection of static electricity charges, providing a continuous conductive surface with large current carrying capacity. Induced charges from lightning are immediately dissipated and fires are prevented. There are no mechanical contacts to cause sparking.

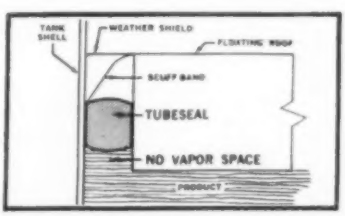
WITHOUT VAPOR THERE CAN BE NO FIRES. . . the inherent design and construction of Hammond Tubeseals eliminates space between roof, shell, and liquid; thus, there is no room for vapor to form . . . no vapor . . . no fires . . . no evaporation . . . no corrosion!

Introduced to the oil industry late in 1955, the Hammond Tubeseal found immediate favor with oil companies all over the world . . . there are now more than 200 installations in operation and building. A measure of their conservation values and fireproof features is illustrated by their record of repeat orders from satisfied users—one large oil company, after several test installations, re-ordered more than a score of Tubeseals. The same story of satisfaction exists wherever a Tubeseal is in operation.

Write for bulletin TS



CONVENTIONAL FLOATING ROOF tank has space below flexible membrane where air-vapor mixtures form. Because metal shoe and membrane cannot be absolutely gas tight, vapor is constantly escaping. This condition causes excessive corrosion, may also result in rim fires from lightning or other source.



HAMMOND TUBESEAL FLOATING ROOF entirely eliminates every space where air-vapor mixtures can form. Hammond Tubeseal completely fills space between product surface and roof seal, so that corrosion is stopped (even for sour crudes), and vapor cannot form—hence cannot ignite or be lost.

THE HAMMOND TUBESEAL
for new or old floating roof tanks,

FEATURES

- **lightning and fire proof construction**
- **no moving parts**
- **no mechanical maintenance**
- **climate-proof**
- **non-corrodible**
- **can operate to bottom of tank or above the top**
- **no vapor space below the seal**
- **entire circumference has tight seal under pressure at all times**
- **longer working life expectancy**

*Patented [1]patent pending [2]names on request

HAMMOND TUBESEAL — THE MOST EFFICIENT AND POSITIVE SEAL KNOWN

HAMMOND IRON WORKS

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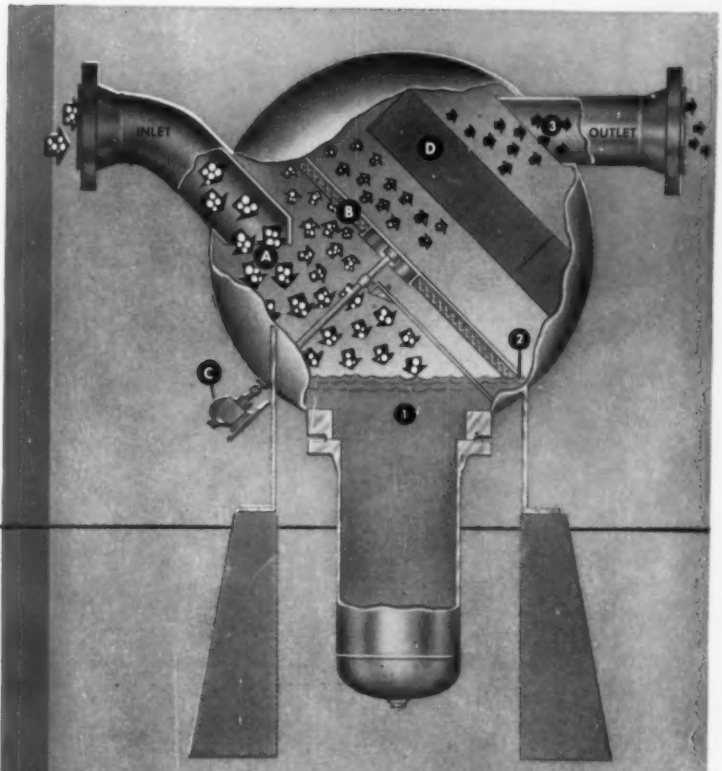
MORE EFFICIENT RESULTS!

PEERLESS SCRUBOSPHERE*

*Spherical scrubber for dust and liquid removal from gas flow

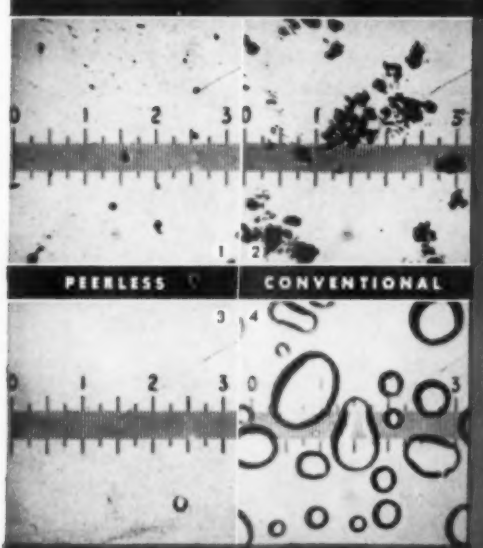


(A) The majority of incoming liquid and solid particles are directed down into reservoir. 1

(B) Lighter solid particles carried by gas stream are separated on surfaces of contactor which are kept wet and clean by revolving through liquid reservoir. 2

(C) Contactor is revolved by explosion-proof gear motor.

(D) Mist Extractor removes any remaining liquid particles from gas stream prior to outlet. 3



These photographs were made of microscope slides introduced downstream of the Scrubosphere and a conventional vertical oil bath cleaner under the same operating conditions. Plates 1 and 2 show the comparative amounts of iron oxide not removed with the amounts introduced being identical. Plates 3 and 4 indicate comparative oil loss with vapor rate through the vessels being the same.

LOOK AT THIS TEST The test at the left indicates the superiority of Peerless Scrubosphere over conventional oil bath dust scrubbers. The SCRUBOSPHERE operates with no loss of efficiency at low flows, minimum liquid loss, and very low pressure drop. Other outstanding features include easy vessel access with removable self-cleaning contactor, a sump for slugs of solid or liquid particles, and minimum cost.

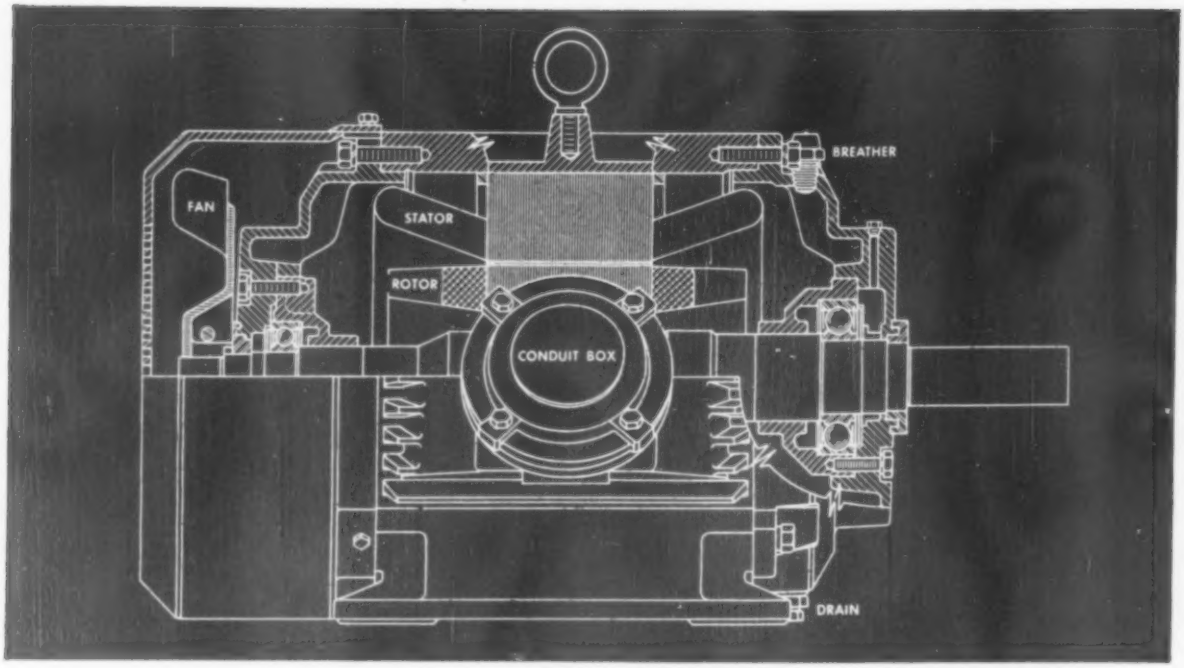
For detailed information write for Bulletin No. 181

PEERLESS MANUFACTURING CO.

P.O. Box 13165 Dallas, Texas

Representatives in All Principal Cities

PEERLESS MFG. CO. DALLAS TEXAS



THIS MOTOR CAN CUT YOUR HAZARDOUS ATMOSPHERE INSURANCE COST

Insuring facilities with electric motors in hazardous atmospheres is generally expensive or impossible without special motors. Reliance has developed a completely new, Underwriters' approved motor design, called explosion-proof, for hazardous locations. In fact this is the only motor design that meets all qualifications for class I, group D and class II, groups E, F and G without requiring modification.

This new motor incorporates all of the outstanding features of the standard Reliance Totally-Protected Motor. In addition, all Reliance Explosion-Proof Motors are built to corrosion-proof standards.

If you would like to have more information on what qualifies a motor for hazardous atmospheres, write for our new Explosion-Proof Motor Bulletin No. B-2409. B-1580

NATIONAL ELECTRICAL CODE CLASSES OF HAZARDOUS LOCATIONS

CLASS I—Those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

Group D—Atmospheres containing gasoline, hexane, naphtha, benzine, butane, propane, alcohols, acetone, benzol, lacquer solvent vapors, or natural gas.

CLASS II—Those which are hazardous because of the presence of combustible dust.

Group E—Atmospheres containing dust of aluminum, magnesium, or their commercial alloys.

Group F—Atmospheres containing carbon black, coal or coke dust.

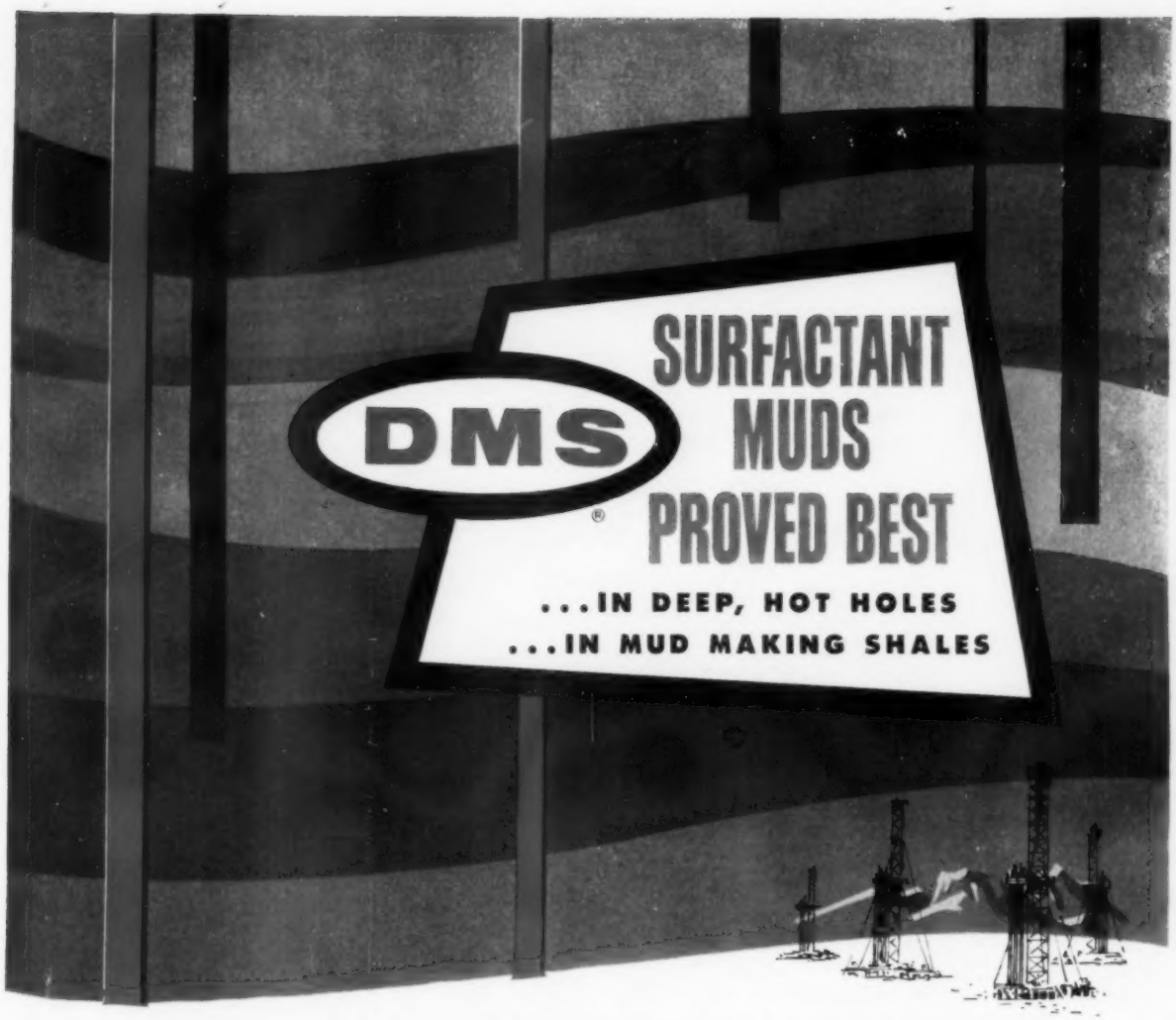
Group G—Atmospheres containing flour, starch or grain dust.

RELIANCE *Totally-Protected* MOTORS

RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 108A, CLEVELAND 10, OHIO • CANADIAN DIVISION: WELLAND, ONTARIO

Sales Offices and Distributors in Principal Cities



NO HIGH TEMPERATURE CEMENTATION, LOW CONDITIONING TIME, LOW VISCOSITIES AT HIGH SOLIDS CONCENTRATIONS, GOOD COMPLETION MUD

DMS® the primary surfactant, & DME® the companion surfactant for oil emulsification

DMS and DME have a reputation in the field for fast, trouble-free deep well-drilling. This is particularly true in mud-making shale formations, and when high temperatures are encountered. DMS inhibits dispersion of drilled clays and shales, and protects producing formations and drilled solids from swelling. Drilled solids are larger and settle in pits faster, resulting in easier maintenance and less barite consumption.

Because of their stability in the presence of different electrolytes, DMS and DME have been used successfully in calcium, sea water, and saturated salt muds. The surfactant additives are not adversely affected by drilled anhydrite and salt.

Overall cost of drilling is reduced by decreased consumption of barite, less mud conditioning time, good formation protection and completion characteristics. This results in faster drilling with more time on bottom and less rig time to completion.

DMS and DME are available in your area from MILWHITE MUD SALES CO. Write direct to MILWHITE using coupon below for complete technical information, giving a description and use information on DMS and DME.

ANTARA gaf

From Research to Reality

ANTARA CHEMICALS
A SALES DIVISION OF
GENERAL ANILINE & FILM CORPORATION
435 HUDSON STREET · NEW YORK 14, NEW YORK

MILWHITE MUD SALES CO.
536 Bank of the Southwest, Houston, Tex.

Gentlemen:

Send me your DMS & DME BULLETIN

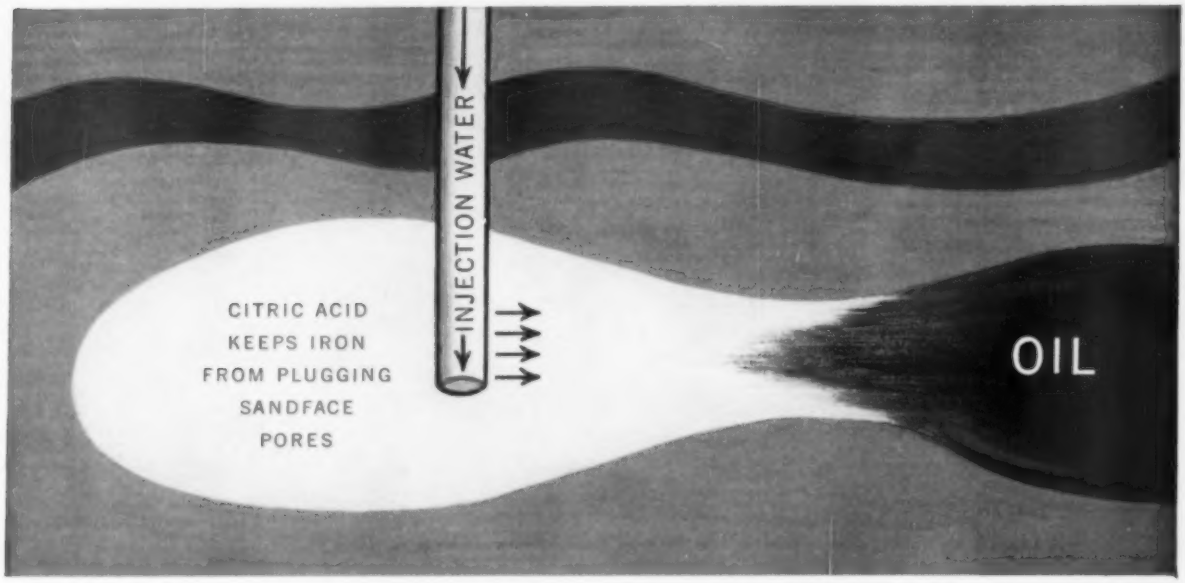
NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

Improve flow rates in secondary recovery



Add CITRIC ACID to injection water

● When you add citric acid to injection water you prevent the formation of iron precipitates which plug the sandface, restricting the flow rate. This means that you reduce the need for temporary (and sometimes costly) methods of freeing iron-plugged wells.

Also important, citric works even in high calcium waters. Citric preferentially sequesters the iron and keeps it soluble. Other ions do not interfere.

Pound for pound, citric acid sequesters iron better and at less cost than any other agent. It's nontoxic and safe to handle, too.

Pfizer supplies huge amounts of citric acid for a multitude of industrial uses throughout the world. This large volume production assures you of receiving all the citric you need without delay. For further information on preventing injection well plugging with Pfizer Citric Acid write to:

CITRIC ACID ADDED
In this bottle, only 10 ppm of Pfizer Citric Acid has been added to brine containing 2 ppm iron.

NO CITRIC ADDED
The brine in this bottle also contains 2 ppm iron. But no citric has been added.

CHAS. PFIZER & CO., INC., Chemical Sales Division
630 Flushing Ave., Brooklyn 6, N.Y.
Branch Offices:
Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.; Dallas, Tex.

Manufacturing Chemists for Over 100 Years

Pfizer

ONE OF A SERIES . . .

What makes Hyatts run smoother and longer?

CARBURIZED INNER RACES

From a fatigue life standpoint, the inner race is the critical member of a roller bearing, because the smaller area of contact between rollers and inner race concentrates the loads upon it. That's why HYATT goes to the added expense of *carburizing* every inner race—to assure you the performance and fitting advantages detailed at the right.

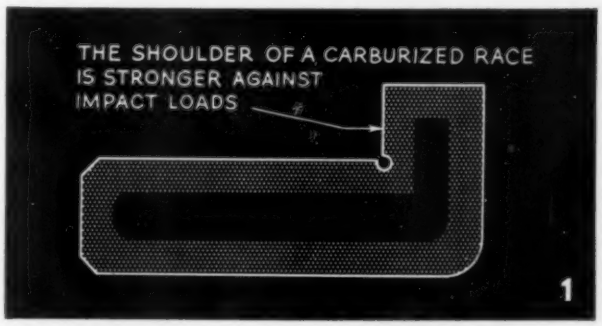
You will find full selection and application data in HYATT Catalog 150, or call your nearest HYATT Sales Engineer. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey. Sales offices at Harrison, Pittsburgh, Detroit, Chicago and Oakland, Cal.

HEAVIER INTERFERENCE FITS

Resistance to relative movement between inner race and shaft is vital to good performance. So HYATT makes practically all inner races of carburizing type nickel alloys instead of through-hardened steel. After carburizing and heat-treating, the outer surface has the hard wear resistance so necessary for an efficient bearing. The low-carbon core remains tough and ductile to permit much heavier interference fits than are otherwise possible.

TOUGHER FLANGES, GREATER LOAD CAPACITY

Carburizing also enables HYATT to obtain substantially tougher inner race flanges. Tests show the shoulders will withstand considerably greater impact loads (Figure 1). The carburizing process has also been found to increase the load-carrying capacity of the race by building up compressive hoop stresses in its external fibres during quenching.



SIMPLER, LOWER-COST MOUNTING

Another advantage of HYATT'S heavier interference fits is the elimination of all auxiliary holding devices. When the carburized inner race is either pressed or shrunk on the shaft according to HYATT fitting recommendations, it becomes practically an integral part of the shaft itself. This permits mountings of the simplest type and lowest overall cost.

GM GENERAL MOTORS

FOR REPLACEMENT BEARINGS, SEE YOUR HYATT INDUSTRIAL BEARINGS DISTRIBUTOR

HYATT HY-ROLL BEARINGS FOR MODERN INDUSTRY

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are always available, always reliable, always economical; from the well through the refinery.

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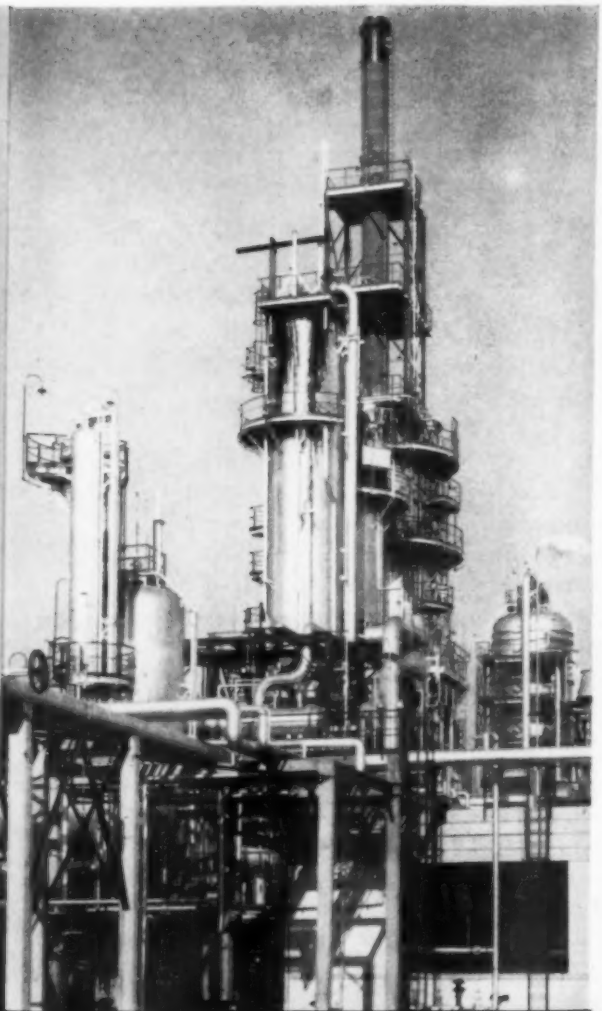
Your Tretolite Service Engineer will be glad to help you with your petroleum problems. There's never any obligation.



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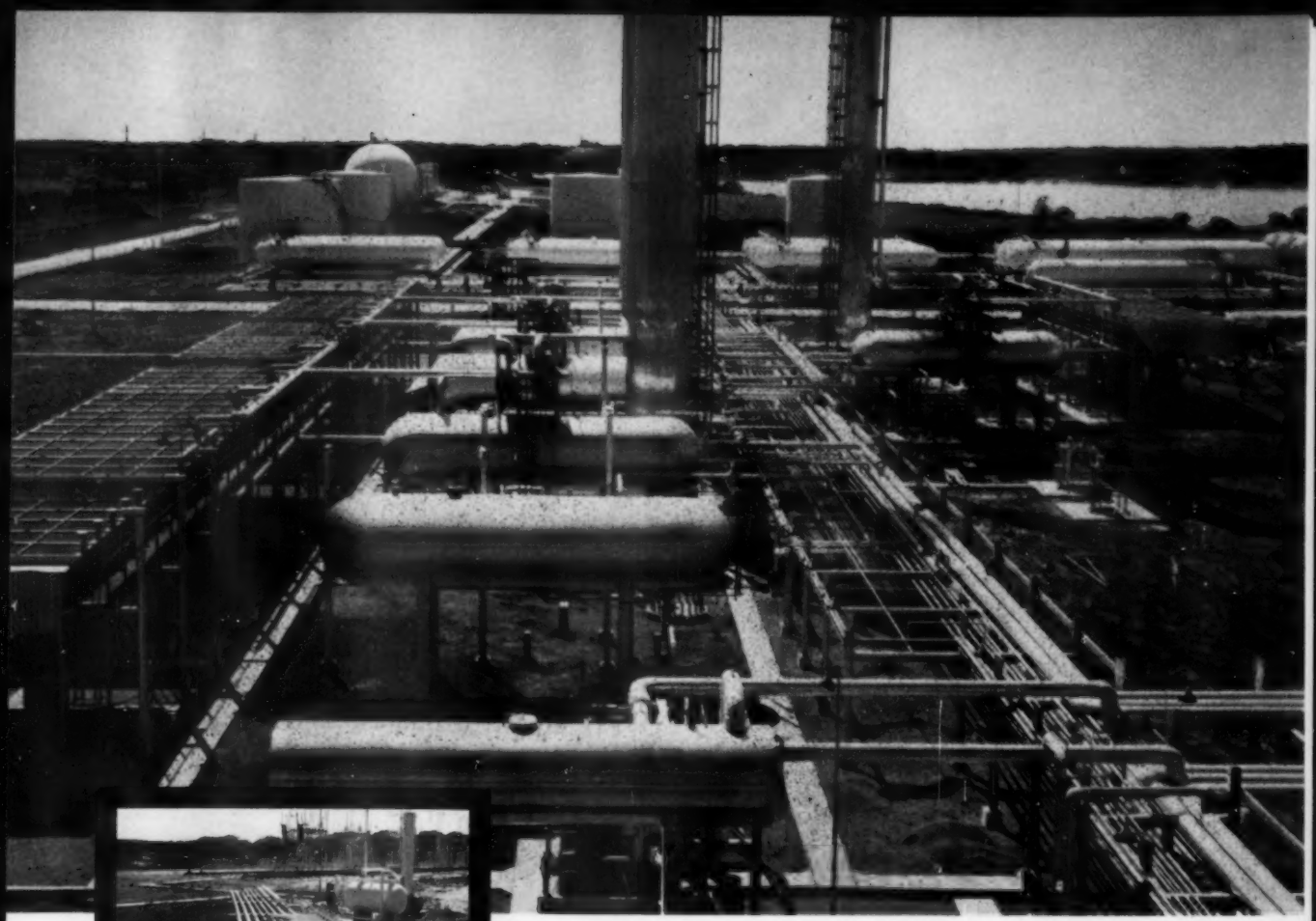
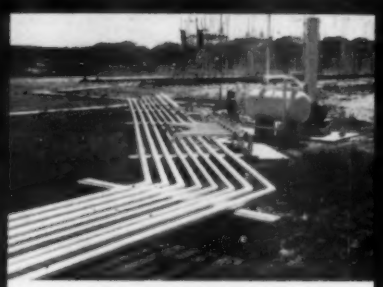
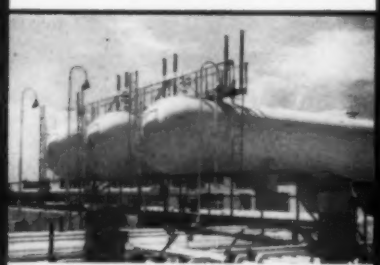


Three-coat systems of Normal Copon self-cleaning white tank coating and three-coat systems of Normal Copon aluminum tank finish were used to protect this fractionating plant of The Bay Petroleum Corp. (a subsidiary of Tennessee Gas Transmission Co.).



Copon pipe coatings provide thicker films per coat for extra protection of seams, welds, sharp edges and other trouble spots.



Copon tank coatings remain tough and elastic when subjected to heat, high humidity and chemical fumes.

tanks stay whiter, brighter... protected by Copon coatings

Coatings of Normal Copon provide superior protection for tanks, pipes, and miscellaneous plant equipment. They cling tenaciously to metal surfaces, withstand the expansion and contraction of metal, and provide longer-lasting film integrity to assure permanent corrosion protection. Expensive surface preparation is not required when Copon-protected tanks are repainted, and Copon Coatings have the slowest rate of erosion in the industry.

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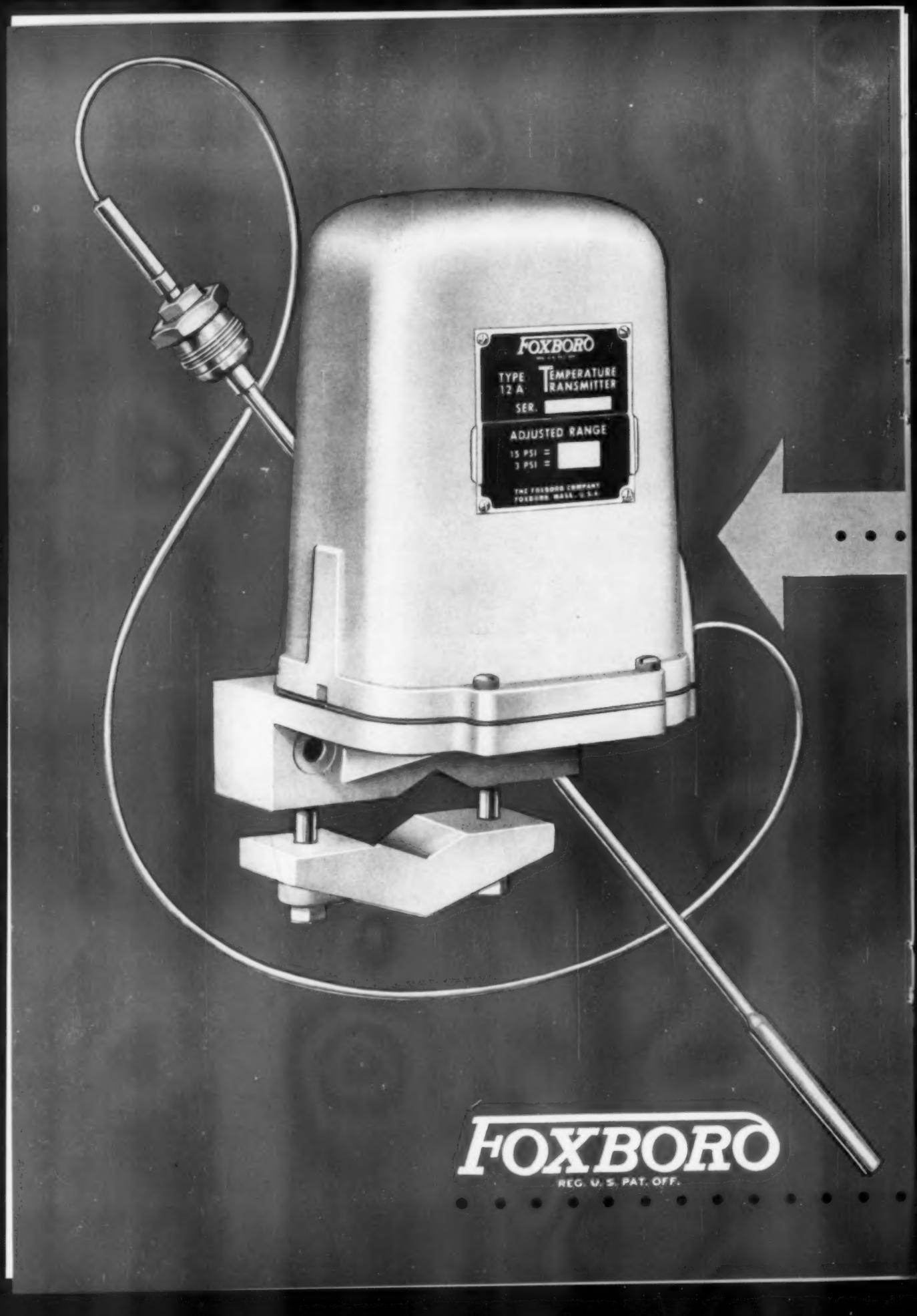
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Temperature Transmitter Improves Remote Control

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There is no easier, simpler way to measure remote temperatures, over so wide a range, with such high sustained accuracy and speed, and at so low a cost!

The Type 12A Temperature Transmitter converts temperature measurements to a linear air output signal, which is transmitted to any standard 3-15 psi recorder or controller. Measuring spans of 50, 100, 200, or 400 degrees F. are available, set as required within the over-all transmitter range of −100°F (lower when necessary) to +1000°F. Fully compensated for ambient temperatures and pressure, this rugged, highly responsive instrument performs outstandingly under the most severe conditions. And it's insensitive to mechanical vibration.

The transmitter weighs only 7 pounds with its integral mounting bracket. It can be mounted anywhere . . . in any position . . . even directly on a bulb socket! The gasketed, weatherproof housing permits installation in any hazardous, corrosive, or outdoor location. Transmission line is conventional air tubing — no troublesome conduit, no costly capillary to run.

Derivative action is furnished for optimum performance when process or transmission lags exist.

Write for Bulletin 13-17. It explains fully why the Foxboro Type 12A Temperature Transmitter gives better performance with lower installation and maintenance cost. **The Foxboro Company, 608 Norfolk St., Foxboro, Mass., U.S.A.**

• •Pneumatic Temperature Transmission

HERE'S self-alignment

IN A STEEL HOUSING

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"Mill Bearings" are available for shafts up to 11 inches.

SUPER-RUGGED CAST STEEL HOUSING. Cap is anchored solidly by extra large dowels and four heat-treated thru-bolts with serrated steel nuts.

LINK-BELT "Mill Bearings" with steel housings compensate for inaccuracies of welded and concrete support structures

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This bearing is effectively sealed, self-contained, factory-adjusted—needs no shims or alignment rings at installation. Get full facts in Book 2565A . . . or Book 2550, which covers industry's most complete line of self-aligning ball and roller bearing blocks. Ask any of the 40 Link-Belt offices or your authorized stock-carrying distributor.

14.442-B

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self-aligning ball and roller bearings

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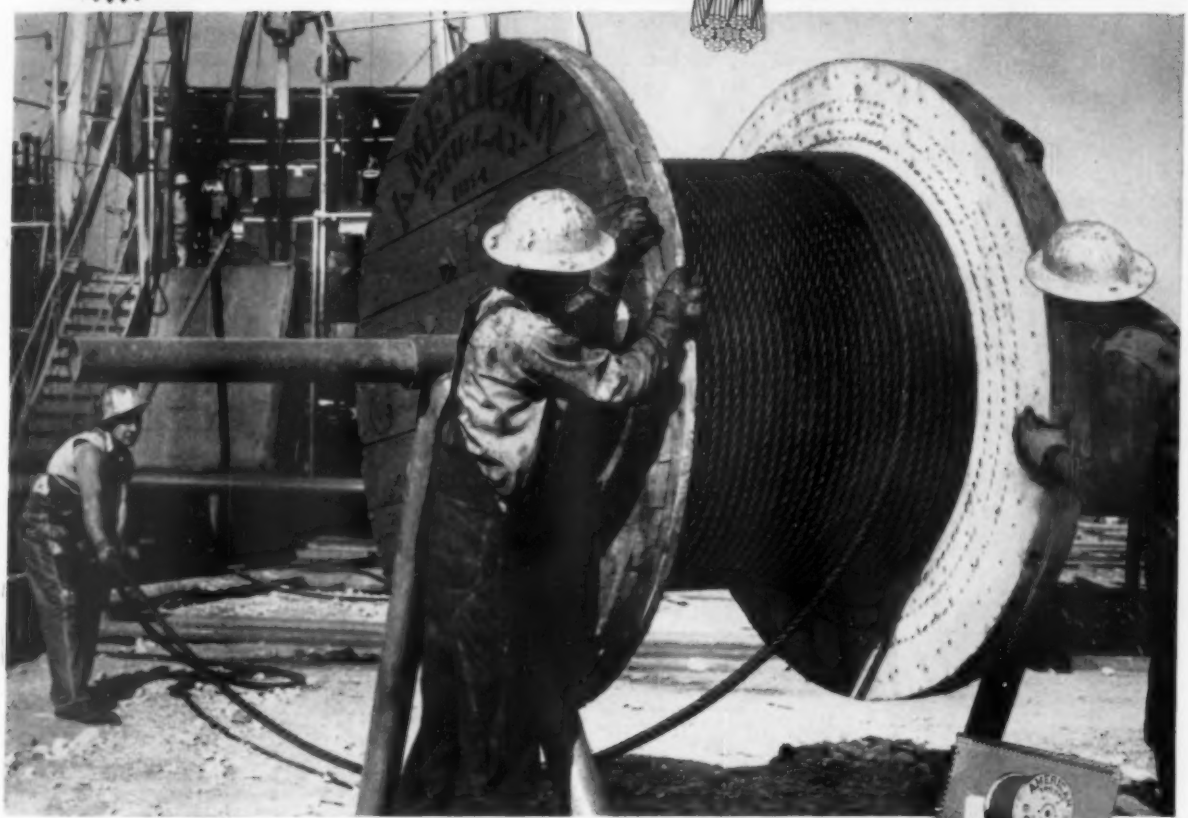
ACCO for Better Values

American Cable TRU-LAY VHS WIRE ROPE 15% STRONGER



This 3-point control program will give you longer, safer rotary line life...

Stop guessing about how much service and safety you can expect from rotary drilling lines! Follow a definite line control program that is tailor-made to meet the specific requirements of your operation. More and more drillers are finding they can cut costs and get record breaking Ton-Mile performance from lines by following this simple 3-Point Control Program.

1. Use Only Tru-Lay VHS Lines. Made from a new grade of rope wire developed by ACCO's own process, VHS has 15% greater tensile strength than Improved Plow Steel. Also tougher and more wear resistant, VHS delivers more Ton-Mile service while resisting abrasion. And you can count on this great new rope to give you the highest safety factor available . . . a mighty important advantage at any depth . . . but especially at 10,000 ft. or below!

2. Buy Tru-Lay VHS in the longest practical length. Thus, with ample line reserve, cut-offs can be averaged-out to economically distribute wear and fatigue throughout the entire line.

3. Follow A Definite Cut-Off Schedule. Because practices vary from rig to rig and from location to location, it is essential for you to adhere to the specific cut-off schedule recommended for your operation.

For help in selecting the right cut-off practice for your lines, call our nearest field representative. When he visits you, he'll have a Ton-Mile Record Book containing reference tables and forms to assist you in carrying out his recommendations.

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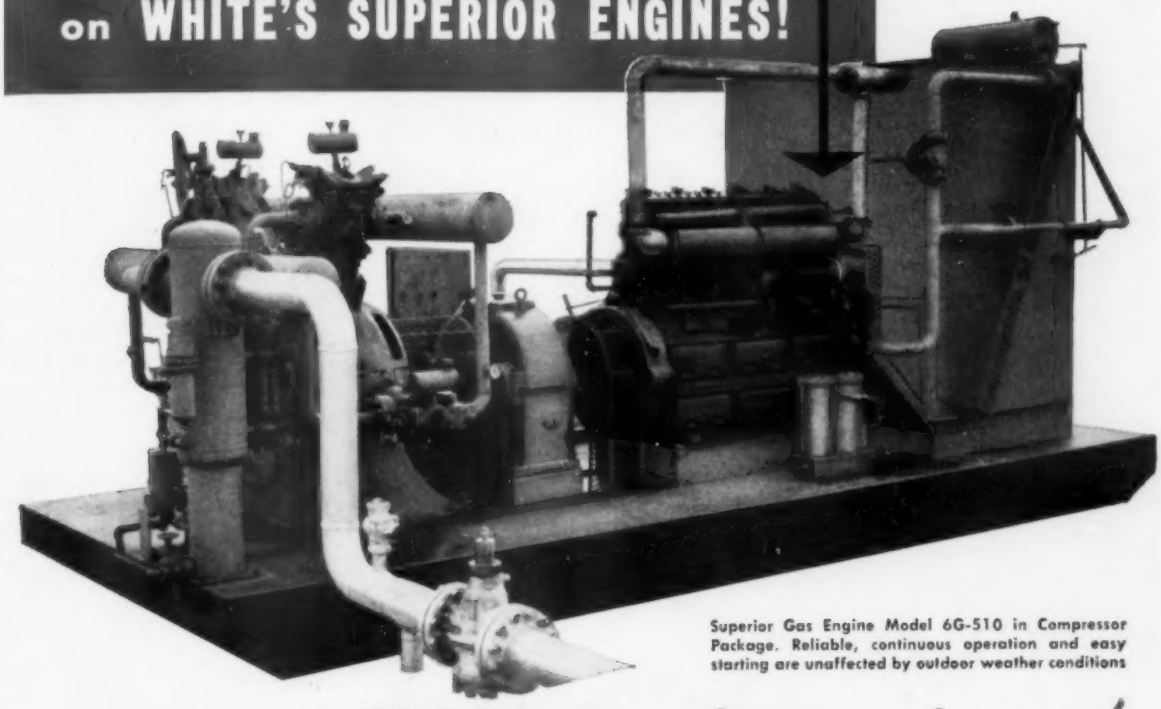

Superior Gas Engine Model 6G-510 in Compressor Package. Reliable, continuous operation and easy starting are unaffected by outdoor weather conditions

more than *50,000 Hours Continuous Operation!*

no major overhaul or part replacement!

Service records show Superior's first major repair usually comes due long after other engines would be completely replaced . . . over 50,000 hours continuous operation has been reported with no major overhaul or major part replacement required. White's extreme design simplicity makes this possible. High mortality parts are eliminated, thus prolonging engine life and reducing repairs and maintenance. Relatively few cylinders and internal parts supply power equal to other engines having more cylinders and more complex design. Precision construction and advanced engineering refinements reduce wear on all parts and guarantee low lube oil consumption. Highly developed, rugged, open chamber combustion system assures maximum fuel economy and also exclusive operation on non-premium fuels. Cost-per-horsepower operation is much lower than comparable models in the same power range. Conservative horsepower ratings allow plenty of reserve to meet extreme operating conditions.

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Diesel, dual-fuel or gas engines range from 190 to 2150 H.P. Portable or stationary generator sets range from 150 to 1500 KW. For pipe line pumping, gas compressor drive and power generation, specify modern, compact, powerful Superior engines . . . field-proven in hundreds of oil field applications! Write today for additional information!

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WHITE DIESEL ENGINE DIVISION
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WHY DOES ONE MUD VALVE SELL BETTER THAN OTHERS?

On the really tough jobs (formation fracturing, cementing, etc.) Cameron Flex-Seal Mud Valves are virtually standard equipment. For normal service also Flex-Seals have consistently outsold all other mud valves. Now the Type "R" Flex-Seal is bringing even more benefits to operators in every oil producing area. You know the following reasons if you have made a comparison with other mud line valves:

1 Longest Wear

The Type "R" Flex-Seal has the longest wear and lowest maintenance of any mud valve. Separate carburized wear rings and tough new gate packer are both many times larger than competitive valves. In most repairs you need only replace the inexpensive packer. Compare these parts with other mud valves—there *is* a difference.

2 Easiest Repair

Simply unscrew four thread protecting extended cap nuts—packer and wear ring lift straight out as a unit. Integral welded subs and bonnet cap make misalignment during repairs impossible. If a sub is sand cut, it may be separated and replaced without buying an expensive body. Gate replacement requires no special fixtures, no intricate thread timing.

3 Easiest Operation

Convenient tiller wheel gives bump operation for extra easy opening and closing. Ballbearing stem nut and stem threads are packed with grease by Alemite fitting. Grease is also injected in upper body void to retard hardening of sand, mud or cement allowing gate to retract easily to open position.

4 Gate Prevents Packer Flow

Flex-Seal has the only mud valve gate with a shoulder to prevent flowing of resilient packer and to prolong its life. Heat treated gate and stem are one solid forging. Upper section indicates open or closed position, also tells amount of wear in packer. Stem packing is oversize resilient lip seal which is mechanically energized when gate is in open position.

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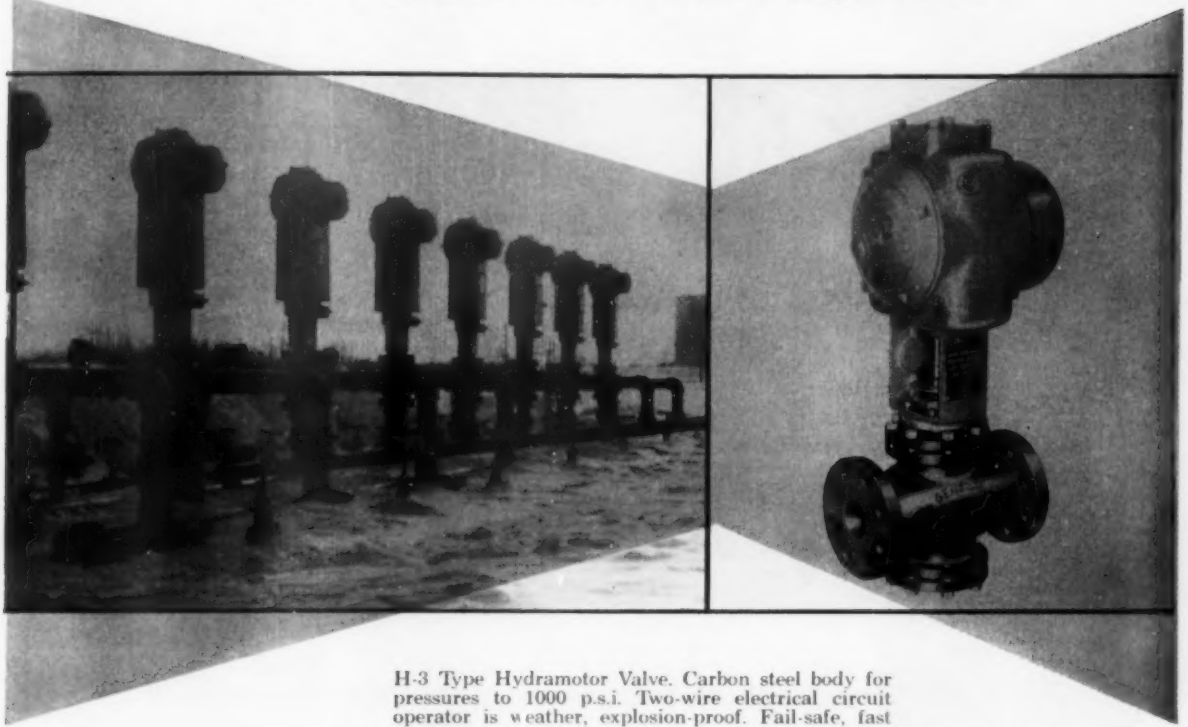

H-3 Type Hydramotor Valve. Carbon steel body for pressures to 1000 p.s.i. Two-wire electrical circuit operator is weather, explosion-proof. Fail-safe, fast closing.

For automatic shut-off, three-way control or tank switching operations, no other motor valve or controller can match the benefits from installing General Controls Hydramotor valves on remote tank and feeder line applications.

Here's why:

No. 1 Hydramotor valves are simple, rugged electro-hydraulic valves that operate on simple, two-wire electrical circuits already available. No additional power source is necessary.

No. 2 Hydramotor valves are *all-electric*, provide interlock without additional valves, yet they *fail-safe* on power interruption.

No. 3 Hydramotor valves completely eliminate the need for extra piping, tubing, strainers, dryers and pilot valves. Overall system cost is much, much lower.

No. 4 Hydramotor valves are simple, trouble-free. Maintenance costs are low . . . eliminated are worries about frozen control lines, leaks and blocks in lines and pilot valves.

No. 5 Hydramotor valves laugh at weather. Desert heat or arctic cold, under conditions where attendants couldn't get to a manual valve, they're on the job 365 days a year, unattended and trouble-free.

WRITE TODAY FOR HYDRAMOTOR CATALOG 11, OR CONSULT NEAREST GENERAL CONTROLS BRANCH OFFICE LISTED IN YOUR YELLOW PAGES. CASE HISTORY OF EAST TEXAS INSTALLATION SENT ON REQUEST

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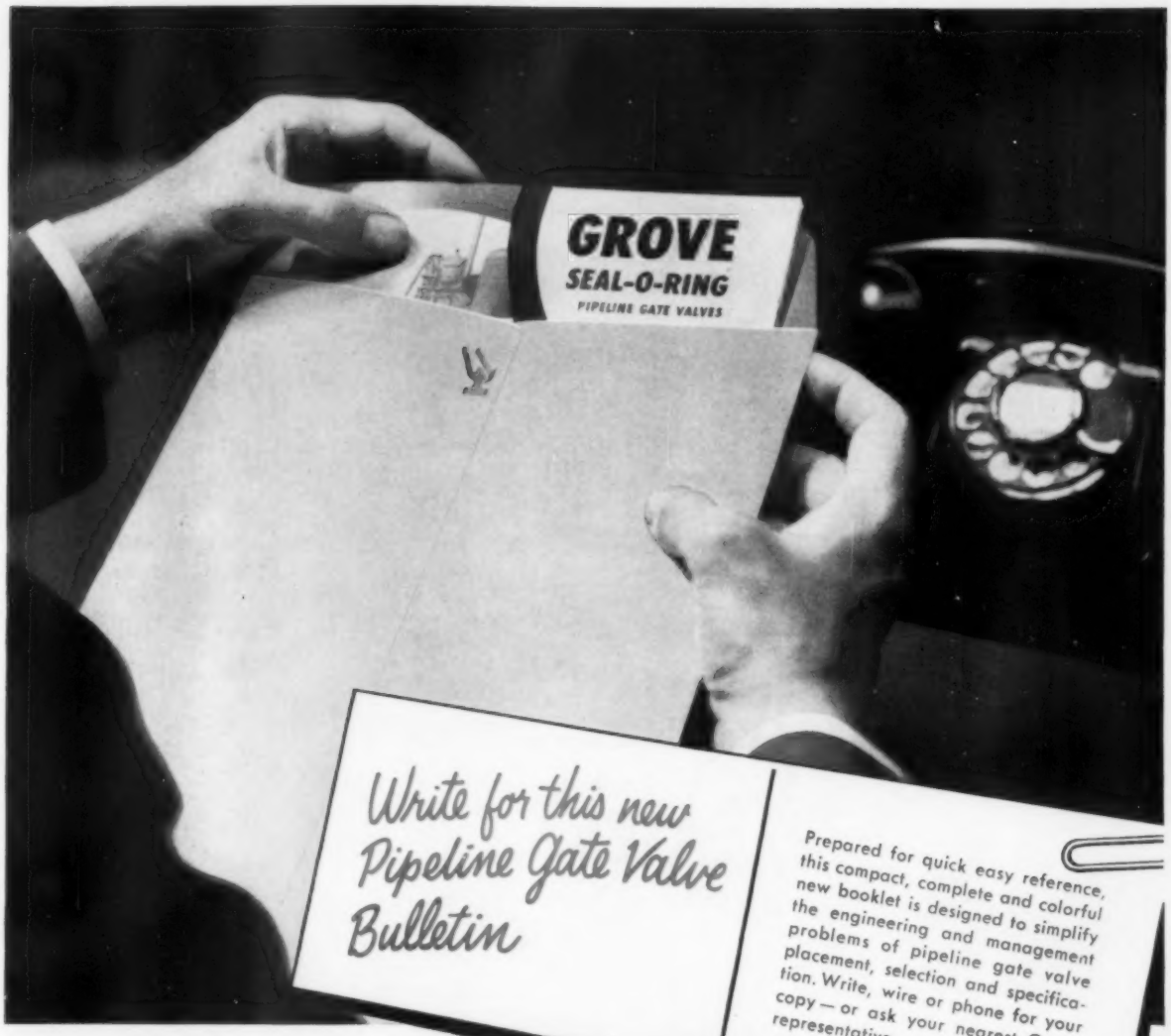

Write for this new Pipeline Gate Valve Bulletin

Prepared for quick easy reference, this compact, complete and colorful new booklet is designed to simplify the engineering and management problems of pipeline gate valve placement, selection and specification. Write, wire or phone for your copy — or ask your nearest Grove representative.

packed with...

VALUABLE INFORMATION on valve design, testing and operation

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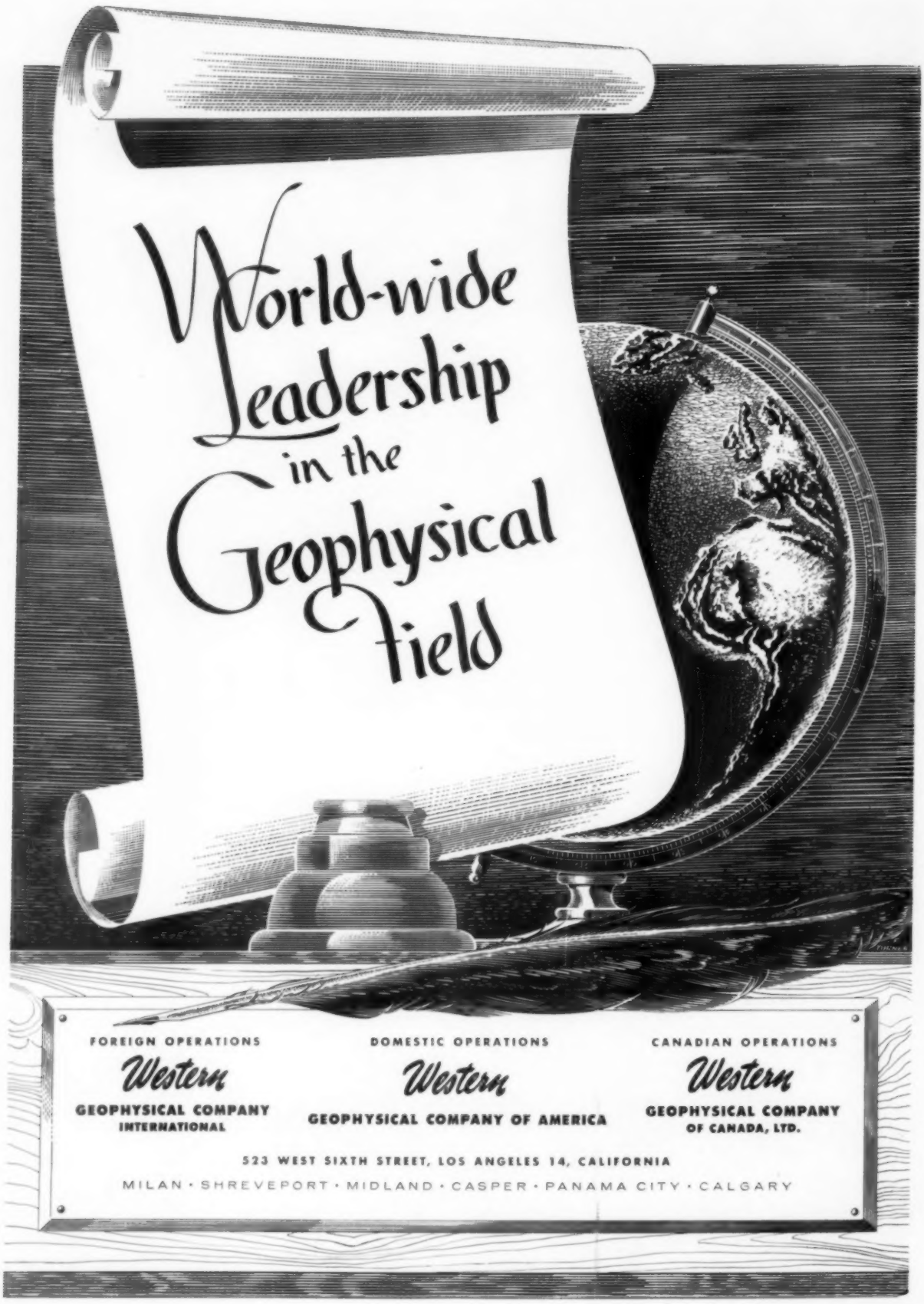
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Now...a New advance in...

Gauge Safety!

Another step ahead in Marsh Gauges: the new Marsh "Safecase". Down to the final detail this gauge is developed for those applications where an unexpected surge of heavy, explosive over-pressure can occur.

In the "Safecase" a solid metal barrier protects the entire face. But, still more important, the *entire back* of the gauge is a thin, ductile plate, designed to open out when subjected to abnormal pressure. Back plate is held firmly to the case by two holding screws and cannot be dislodged by a pressure blowout.

In exhaustive tests it has never been possible to shatter the crystal or create any other dangerous condition in a "Safecase" gauge with its safety-release back. The accompanying illustration shows the result of one of a series of tests in which blank cartridges were fired in the back of the case without even breaking the crystal. Think what that means in safety to operating men!

Yes, an important development . . . but merely the kind you would expect from the manufacturer who originated the "Connoweld" tube, the "Marshalloy" case, the Mastergauge movement and practically all of the major advancements in pressure gauges. Ask for up-to-the-minute information.

Pressure of explosive force merely opens out safety back

Instead of depending on blow-out plugs, entire back of Safecase Gauge is designed to yield to over-pressure. Photo at left shows actual result of firing cartridge within back of case. Safety-release back exhausted pressure. Front remained intact.

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Sales affiliate of Jas. P. Marsh Corp.
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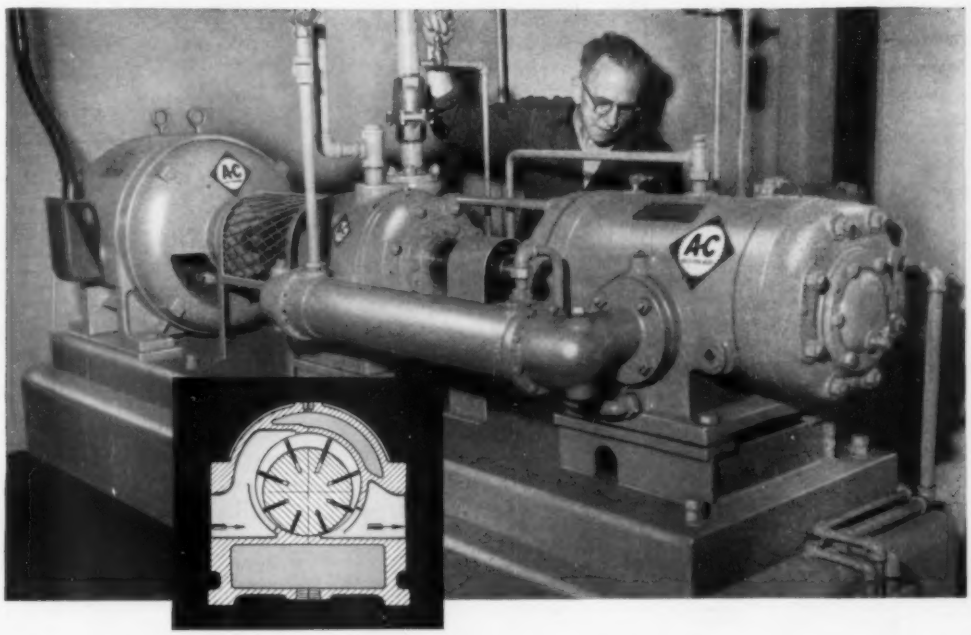
"THE STANDARD OF ACCURACY"

MARSH GAUGES

RO-FLO

Compressors cut vibration . . . eliminate wear and tear



Low maintenance is one of 4 advantages

ROTARY motion and fewer parts reduce maintenance costs to a minimum. Lack of vibration and shock, plus the absence of reciprocating parts — pistons, valves, connecting rods — eliminates major causes of trouble.

Other advantages are:

Constant efficiency — During operation the sliding vanes of the rotor press outward against the cylinder wall to form air cells (as shown in drawing). The rotating force holds vanes tightly against the cylinder wall under all conditions, and air cell size, air flow, and efficiency always remain constant.

Compactness — No extra weight or size needed to dampen vibration.

Low-cost foundations — Smooth operation eliminates need for heavy, costly foundations. Small units are bolted directly to floor . . . large units need only a simple slab.

Many Types and Sizes

Single-stage units for pressures to 50 pounds gauge, and volumes from 42 to 3245 cfm. Two-stage units for 250 to 1800 cfm at pressures from 60 to 125 pounds gauge.

Single and two-stage vacuum pumps for vacuums to 0.3 inch mercury absolute from 22 to 5950 cfm.

For Information — Call your nearby A-C office or write for Bulletin 16B8244 (two-stage) and 16B-8126 (single-stage). Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

Ro-Flo is an Allis-Chalmers trademark

ALLIS-CHALMERS

A-5354

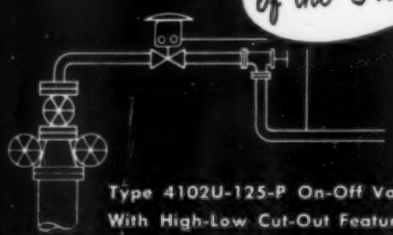
FISHER

Hi-Low Cutout Controllers

The Sentinel of the Field

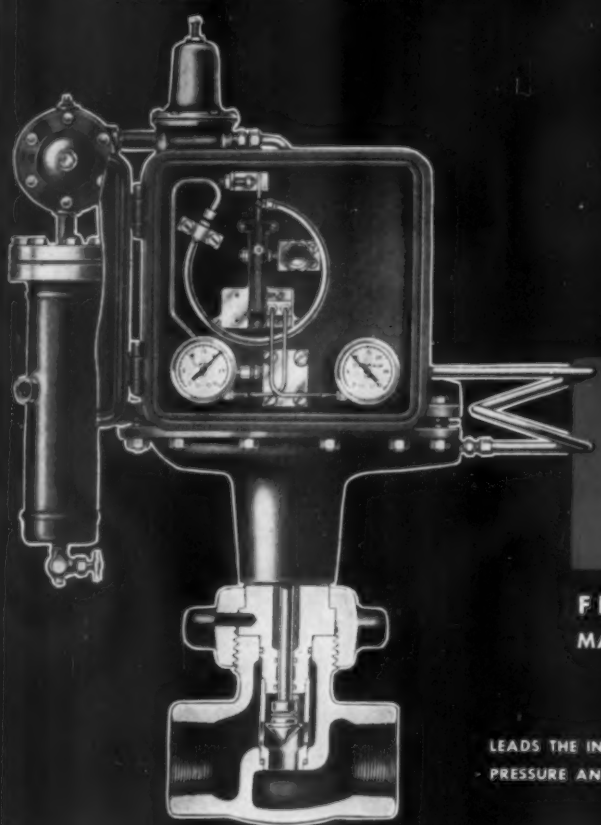
Type 4102UR-125-P Field Valve With Low Pressure Cut-out Feature

Always on guard, the Fisher Type 4102UR pilot when installed in gathering lines will throttle or reduce the pressure to separators and will automatically close if a break in the line occurs, thus protecting the system from costly loss.



Type 4102U-125-P On-Off Valve With High-Low Cut-Out Feature

Ideal as a high-low pressure well head safety valve. Will stay open, but will automatically close if pressure goes above pressure limitations of downstream piping. Will also close if pressures fall too low *due to* a break in downstream system.



- Wizard available with bronze or steel Bourdon tubes up to 5000 psi.
- Rugged and compact—entire controller not over 2 feet high.
- Series 125–P field valve supplied with heavy cast steel body good for 2000 psi.
- Topwork action reversible in field with no additional parts.

SPECIFICATIONS

Body—Cast Steel—2000 psi WOG.
Sizes—1" and 2" screwed angle or globe.

Valve Cage—440 hardened St. Steel. (Tungsten carbide insert also available.)

Orifice Size—1" Body—½", ⅜", ½", ¾". 2" Body—¼", ⅜", ½", ¾", 1".

Inner Valve—440 hardened St. Steel. (Tungsten carbide tip also available.)

FISHER GOVERNOR COMPANY
MARSHALLTOWN, IOWA • WOODSTOCK, ONTARIO

LEADS THE INDUSTRY IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

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Division of Union Carbide Corporation
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CARBIDE's mono- or diethanolamine give you excellent removal of CO_2 and H_2S. By converting the extracted H_2S to sulfur or H_2SO_4, you benefit by recovering a valuable product—thus reducing your operating costs.

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6 YEARS DRILLING WITHOUT OVERHAUL

UNIT RIG DRAWWORKS

Another Unit Rig Drawworks has chalked up an outstanding operational record. In Venezuela, this U-15 drawworks drilled for six years without requiring a single major repair. Put into operation by Loffland Brothers Company of Venezuela in 1951, this rig has drilled 78 wells, a total of 633,729 feet, with an average well depth of 8124 feet. For information on a Unit Rig to fit your drilling requirements anywhere in the world, contact your Mid-Continent representative.

Shown in operation in Venezuela is the Unit Rig U-15 drawworks powered by Cummins LRI-600 engines.

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DU PONT *Petroleum Chemicals* NEWS

Number 78 in a Series of Bulletins for the Petroleum Industry

AUGUST 1957

Three major projects insure still better TEL delivery, service

NEW ASSISTANT TO THE TECHNICAL MANAGER

ANTON O. MELBY is assistant to the Technical Manager of the Du Pont Petroleum Chemicals Division. His duties involve the coordination of both technical service and new product development.

He came to this post from the Du Pont Petroleum Laboratory where he was in charge of the gasoline additives division. Among the projects of this group was the development of Dimethyl Formamide (DMF) as a gasoline anti-icing agent. Prior to this he was supervisor of the Petroleum Laboratory group working on combustion and scavenging.

In connection with his work at the Laboratory, Mr. Melby published a number of technical papers on combustion reactions and the effect of additives. Among them are papers titled: "An Investigation of Pre-ignition in Engines," "The Effects of Fuel Additives on the Precombustion Reactions of n-Heptane."

Following three years of service in the Army during World War II, Mr. Melby earned a B.S. degree in chemical engineering at the University of Wisconsin. He then continued his studies, at the University of Michigan, receiving an M.S. degree there in 1949. He joined the Du Pont Petroleum Laboratory staff in 1950.

He is a member of the Society of Automotive Engineers and the Petroleum Division of the American Chemical Society.

Du Pont adds important facilities in first half of '57

The new TEL storage and delivery terminal at Beaumont, Texas, is the latest addition to the rapidly growing list of Du Pont facilities for serving the company's TEL customers.

Earlier this year the TEL tank-ship, *MV Petrochem*, which was commissioned two months ago, became another major addition to Du Pont's tetraethyl lead distribution setup. The Petroleum Chemicals Division's new TEL manufacturing plant has been completed at Antioch, California. It is the only TEL plant located in the important West Coast refining area.

THE RECENTLY COMPLETED Du Pont TEL terminal at Beaumont, Texas. It contains complete modern facilities for the storage and handling of TEL, and rapid dispatch of loaded tank cars.

The new Beaumont terminal, which represents an important delivery convenience for Gulf Coast refiners, will be supplied from the Du Pont TEL plant at the Chambers Works, Deepwater, N. J., by the tank-ship.

The terminal has ample storage capacity to meet the expanding TEL requirements of the Gulf Coast refineries. It contains complete TEL handling facilities. A rail siding on the property means that a number of TEL tank cars can be pre-loaded there and be ready for immediate dispatch to any refinery in the area. A dock and special unloading equipment for the new tank-ship are also important segments of the operation.

This means that the new Beaumont terminal is equipped to provide refiners with the same TEL availability and fast delivery service as Du Pont's manufacturing plants.

Unique ship

The *MV Petrochem* is a two-cargo vessel. Designed primarily to move bulk

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

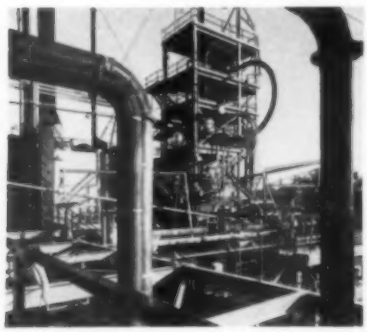
CONTINUED *Major Projects*

shipments of TEL south, she is equipped also for transporting ethyl chloride and ethylene dichloride on the northbound sailing.

THIS 6,000-TON SHIP, *MV Petrochem,* **is the first overwater chemical carrier to transport TEL compound in bulk.**

New West Coast Plant

Du Pont's new TEL manufacturing plant at Antioch, California, was constructed to meet the needs of the fast-growing West Coast oil industry. The new plant makes possible fast, short-distance shipments of California-made TEL to all West Coast refineries.



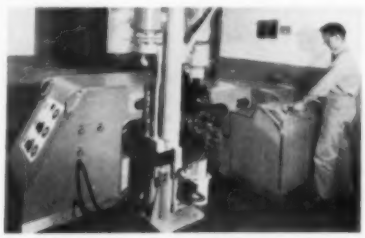
THIS NEW Du Pont TEL plant in California incorporates the most modern, continuous process TEL manufacturing facilities in the world.

These three major expansions will increase even more the efficiency of the nationwide network of Du Pont TEL facilities – which, as previously, includes also conveniently located rail sidings with loaded tank cars in 14 major refining areas across the country, plus the five Petroleum Chemicals Division regional laboratories and the twelve sales and service offices.

The many technical, marketing, research, safety, and operational services offered by Du Pont . . . the most complete line of petroleum additives offered by any supplier . . . the new facilities—these together assure you of getting the most out of your additives program.

New facts about knock uncovered by spectrometric study at Du Pont Petroleum Laboratory

A versatile spectrometer geared to a single-cylinder engine is being used at the Du Pont Petroleum Laboratory to study the reactions responsible for the cool, blue, and intense blue flames which are obtained in an engine combustion chamber as it is motored under increasingly severe operating conditions.



HERE IS the unique spectrometer used by the Du Pont Petroleum Laboratory for studying the chemistry of knock and the fundamentals of combustion. The operator is shown adjusting the amplifier for recording. Part of the single-cylinder engine can be seen in the center of the picture.

As a result of these studies, spectral evidence has been found by the Laboratory indicating that these reactions progressively involve more extensive degradation and oxidation of the fuel. Hydrocarbon decomposition and formation of carbonyl compounds are involved in reactions emitting cool flames. And further oxidation of carbonyl compounds is especially important in reactions giving blue flames.

Free radical reactions

The free radical reactions occurring under intense blue flame conditions easily lead to auto-ignition and knock. But tetraethyl lead apparently interferes with this series of reactions by slowing down carbonyl decomposition reactions under blue flame conditions, possibly by deactivating free radical intermediates.

A detailed account of this study was recently published. When writing for a copy, refer to the title, "Spectrometric Investigations of n-Heptane Preflame Reactions in a Motored Engine."

New book gives detailed information about Du Pont Fuel Oil Additive No. 2

Du Pont FOA-2 is probably the most versatile of all fuel oil additives. Its wide range of applications includes home heating, residual, and diesel fuels of all grades . . . for railroad, marine, truck, tractor and stationary engines. It has also been found to be highly effective for cleaning heat exchangers and sludge-laden tanks.

To help refiners benefit fully from FOA-2 in all these applications, we have just published a comprehensive 24-page book about it. All the basic information you will need is included—composition and properties, use concentrations, handling and additive methods, performance testing, and a discussion of the quality of FOA-2 in all its applications. The book is fully illustrated with photographs, charts and diagrams; a copy is yours for the asking. Just write our nearest sales office.

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Davison, long the leading catalyst supplier, now offers two antioxidants to the refining industry . . . Dav-Ad 101 and Dav-Ad 102.

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SALES OFFICES: Chicago, Ill.; Houston, Tex.; New York, N. Y.; Baltimore, Md.; San Francisco, Calif.; Tulsa, Okla.
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gets your new wells

ASK YOUR BAROID SERVICE ENGINEER ABOUT TRIMULSO

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Your next wells can get on production weeks sooner...

if your contractor uses TRIMULSO.* This low-solids oil emulsion drilling fluid is setting today's standards for fast, trouble-free drilling . . . and helping to reduce drilling costs. It's made with Aquaness emulsifiers . . . the *original* high speed drilling fluid emulsifiers. It has been used with superior results in over 500 wells throughout the United States and Canada.

Drills more feet per hour . . . penetration rates on offset wells average 26 to 41% higher with TRIMULSO than with conventional fluids. More weight can be put on the bit.

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Reduces lost circulation . . . mud is light weight, pressures are low.

Mud control is easy . . . cuttings settle quickly from low viscosity fluid. Mud flows like water; its viscosity can be readily decreased or increased.

Inhibits corrosion . . . protects drill pipe against salt and acid by forming a protective film on metal.

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LOOK FOR THE AQUANESS SEAL

. . . it identifies the *original* low-solids high-speed drilling fluid emulsifier, made by Aquaness to highest standards of uniformity for leading mud companies.

ATLAS

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It's a real slick little tool that can save you a lot of fixed capital investment - and bother - each year.

To obtain well pressure reading, insert master gauge with Connector in Gauge Valve and turn gauge 45 degrees. Gauge Valve opens automatically, exposing gauge to pressure. Remove gauge and Gauge Valve closes automatically.

HERE'S HOW IT WORKS: Instead of buying one or two pressure gauges for each Christmas tree, you buy just one master gauge *for an entire field*. Then, install these inexpensive Gauge Valves where you have been installing permanent type gauges—one on the tubing and one on the casing. Your Gauger takes the master gauge from well to well, stabs it into the Gauge Valve to obtain the pressure reading.

Only one gauge to buy.
No breakage.
No gauge repairs.
No exposure to elements.
No inaccurate pressure readings.

Ask any UNIBOLT man to demonstrate the Gauge Valve and Connector, or write:

THORNHILL UNIBOLT CRAVER CO.

P. O. BOX 1184 • HOUSTON, TEXAS

Bigger cargo area!

Another new and bigger Forward Control 'Jeep' Truck—the FC-170—puts a big 9-foot platform stake body on a wheelbase only 103½-inches long. This 7,000-pound GVW workhorse has room for 49 bales of hay, 35 bags of cement, or 60 bushel baskets. And the bed is only 35-inches from the ground for back-saving ease of loading!

"Go-anywhere" action!

The new 'Jeep' FC-170 Truck sets a new standard for "big-load" maneuverability. It delivers payloads of up to 3500-pounds to areas ordinary vehicles can't reach. The spacious Safety-View cab puts you in a "Forward Control" position—lets you maneuver on or off the road with greater command of any driving situation!

Tough-job traction!

The extra traction of FC-170 4-wheel drive, and its wide 63-inch tread, take you "almost anywhere" with ground-gripping stability. It shifts easily into conventional 2-wheel drive for highway travel. The high-torque Hurricane 6-226 engine delivers real working power at low cost. It's ready for your bigger, tougher jobs!

New 'Jeep' 4-Wheel-Drive / Forward Control FC-170

Willys... world's largest manufacturers of 4-Wheel-Drive vehicles

...other members of the famous 'Jeep' family:

Forward Control 'Jeep' FC-150

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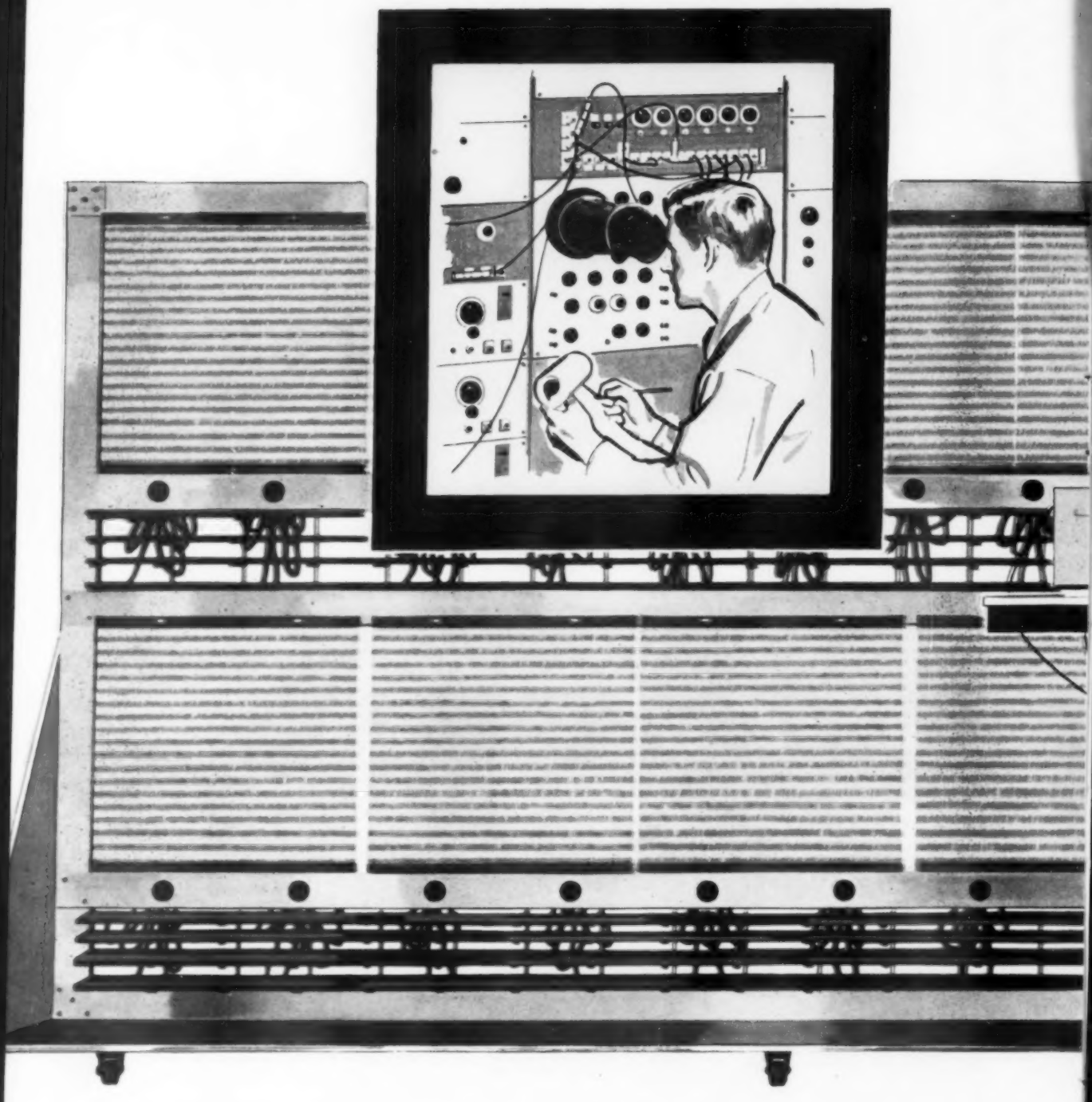
See 'Jeep' vehicles at your Willys dealer



50,000 RESISTORS . . . . . "a researcher's oil well"

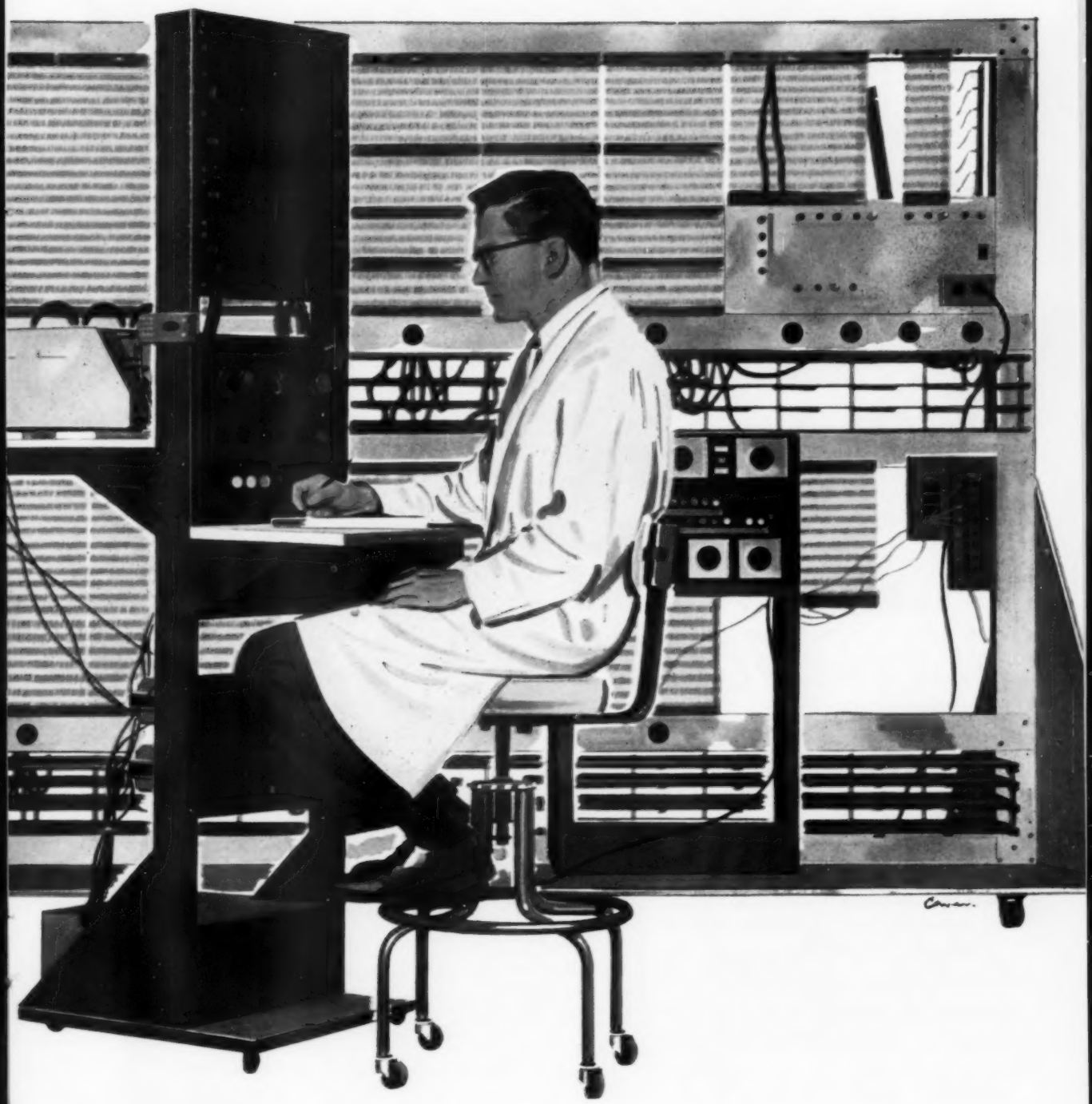
Rather surprising to think that formation characteristics can be duplicated in the laboratory, yet, it's done every day. A network of 50,000 resistors, in various combinations, is used to simulate bore hole parameters which affect resistivity measurements. All resistivity logs—including normals, laterals, micrologs, microlaterologs, and laterologs —can be studied.

Such research techniques have made it easier for you to find oil and gas.

From Schlumberger's Research Center, located at Ridgefield, Connecticut, have come the logging devices, the advanced interpretation methods, the applications of physics to geology . . . all for better definition of oil and gas reservoirs.

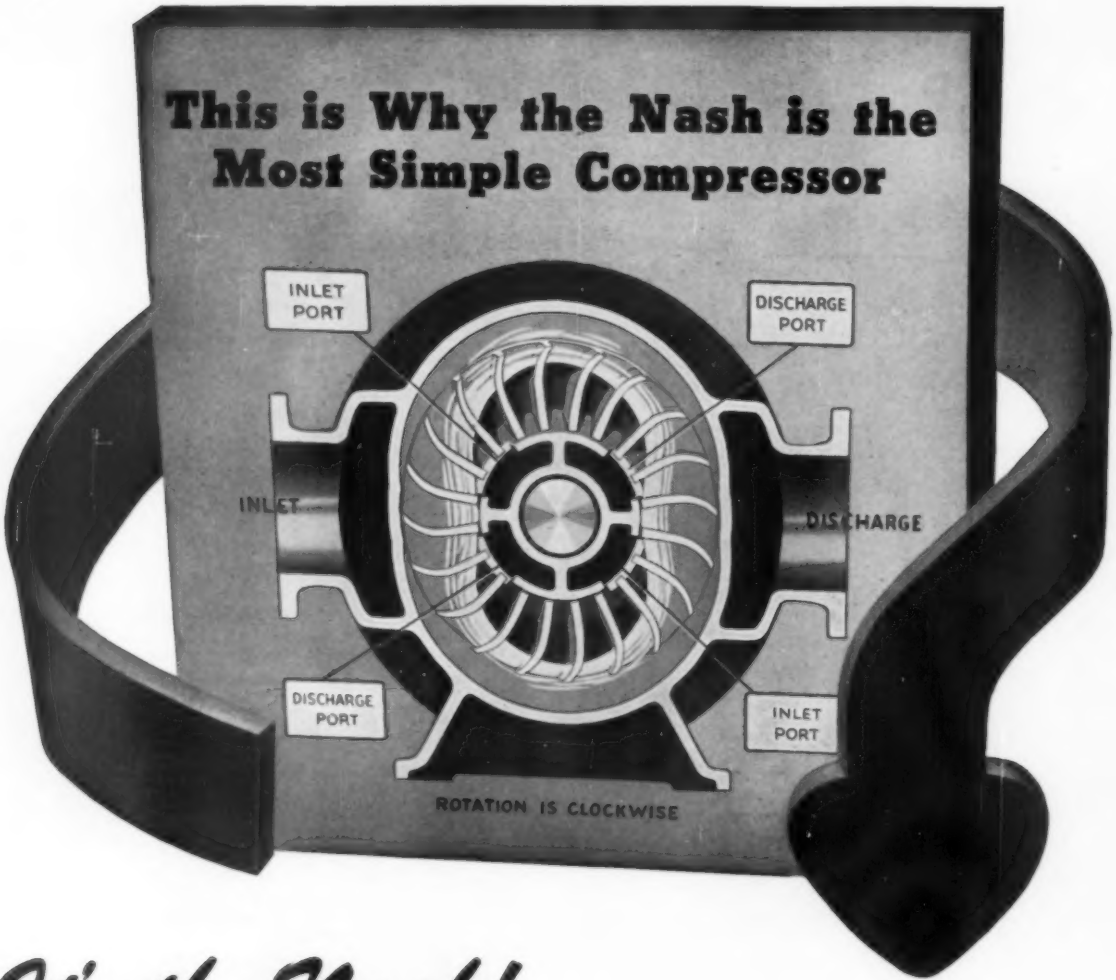
At Ridgefield, laboratory experience is combined with field know-how to find the solutions to oil exploration problems. Through research, the answers to what might be needed in the future will be provided. They may be in the form of new tools, refinements of present tools, or new analysis methods.

The answers will come to you from Schlumberger.



SCHLUMBERGER . . . Engineering for Better Service

This is Why the Nash is the Most Simple Compressor



It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

313 WILSON, SO. NORWALK, CONN.

Strong Joints for Long Strings

J&L BUTTRESS-THREAD CASING

J&L Buttress-Thread Casing joint is designed to support great weight.

The long coupling has completely engaged runout threads (five per inch) with ¾" taper per foot and a flank angle of three degrees. The Buttress-Thread, applied to non-upset casing, develops practically the full strength of the body of the pipe.

J&L Buttress-Thread stabs easily and makes up quickly — a time saver.

The product, as in the case of all J&L pipe, is of high quality by reason of mine-through-mill methods and controls of exceptional precision and care.

Available in seamless casing in grades J-55, N-80, P-110 and higher grades.

For further information consult your near-by J&L Supply store, sales office, or resident salesman.

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SUPPLY DIVISION – Tulsa

J&L – A GREAT NAME IN STEEL

(44)

champion fruit and vegetable peeler... CAUSTIC SODA!

Food is a giant industry. In the short span of seventeen years, the national retail expenditures for food have jumped from $15 billion in 1939 to over $71 billion in 1956 . . . and they're still growing fast!

Obviously, in the processing of large volumes of food, factors such as efficiency, speed and economy play a spotlight role as they do in any large business. The best way to skin a potato, tomato, peach or pepper is vitally important. Versatile caustic soda provides the answer—again.

Fruits or vegetables to be de-skinned are placed on a moving conveyor, then dunked in a hot caustic solution which immediately attacks the skin. The resulting action might be termed "controlled surface cooking" because only the skin is cooked.

A light water rinse washes most of the caustic away, then high velocity water sprays wash away the loosened skin or peel as well as any trace of remaining caustic.

This operation is not only speedy, but unlike manual or mechanical peeling, there is little, if any, loss of the fruit or vegetable.

Caustic soda is also used extensively in the production of chemicals, rayon and film, petroleum, pulp and paper, textiles, soap and cleansers, rubber, vegetable oils, metals and other goods. This "workhorse" is a basic Columbia-Southern product, as are chlorine, soda ash and related chemicals.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION
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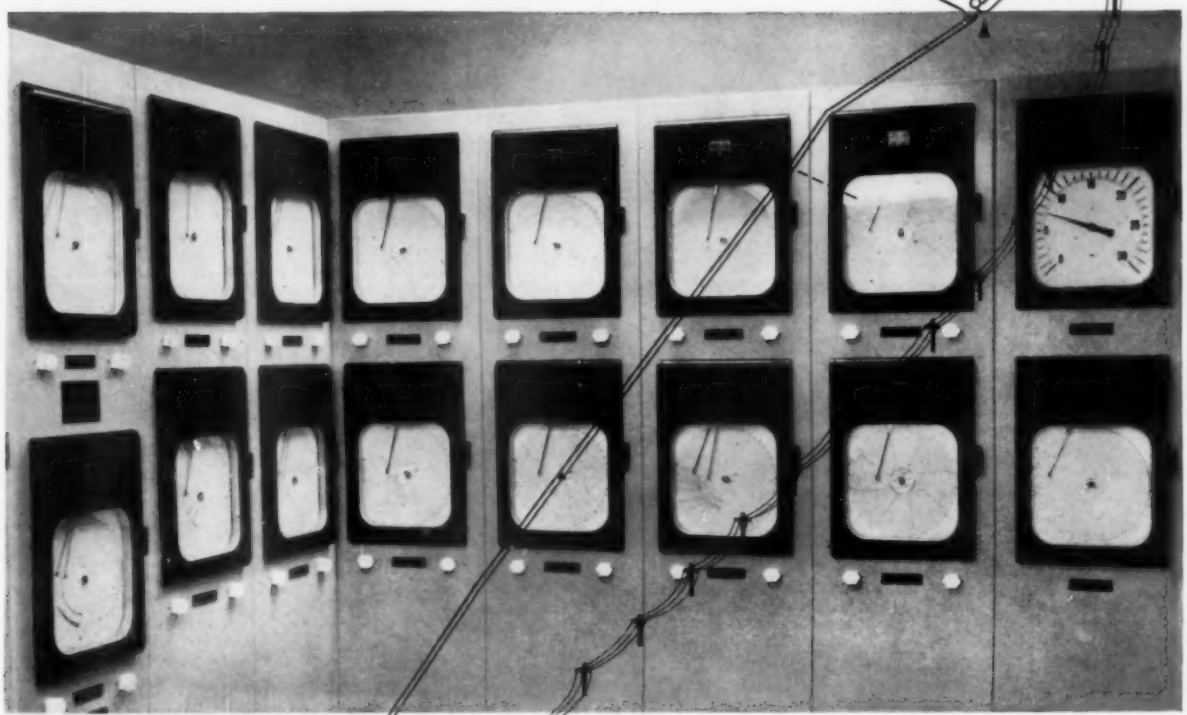
Bristol telemetering puts 24-hour guard on 700-mile pipeline



BRISTOL METAMETER* RECEIVERS (*photo, above*) at Kansas-Nebraska Natural Gas Company's Phillipsburg, Kansas, office give gas dispatcher complete data from field and compressor stations miles away—including suction, discharge, differential pressures and BTU values. Map shows telemetering system from southwest Kansas field to Phillipsburg. Pipelines serve Cozad and Grand Island, Nebraska (not shown).

Monitors BTU values as well as suction, discharge, differential pressures over far-flung natural gas system.

With a new Bristol multiplexed Metameter* telemetering system, Kansas-Nebraska Natural Gas Company, Inc. gets continuous supervision and remote-control from the dispatcher's office a Phillipsburg, Kansas, over pipelines from the southwest Kansa Hugoton Field to Cozad and Grand Island, Nebraska.

Compare this with the once-an-hour readings the dispatcher used to get with the old system! And these readings used to take 15 to 20 minutes to come in through the operator at Scott City, who radioed in readings from Lakin, Holcomb and Deerfield—as well as his own readings.

But the biggest advantage of all in the new system is the increased reliability and dependability Kansas-Nebraska is able to give customers.

Find out how advanced Bristol telemetering and centralized control systems can step up service and reduce costs on your pipeline. Write: The Bristol Company, 120 Bristol Rd., Waterbury 20, Conn.

*T. M. Reg. U S. Pat. Off.

7.13

BRISTOL TRAIL-BLAZERS IN PROCESS AUTOMATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

In Crowded Waterways . . .

RCA
CR-105B RADAR

. . . or Open Seas

For Safer Navigation—Accurate Position Finding

RCA CR-105B Small Boat Radar is the choice of workboat operators with an eye to all-around efficiency and top performance. Here's why:

Accuracy—a big, bright 10-inch scope provides sharp, detailed presentations ranging from 50 yards to one mile for close-in navigating . . . 2, 4, 12 and 32 mile ranges on the open sea. Sharp horizontal beam produces high resolution.

Compactness—space saving design ideal for small craft where space is always at a premium. Indicator requires only 2 square feet of deck space; antenna is lightweight.

Economy—low power drain plus 7 kw peak power means lower operating costs with no sacrifice in efficiency. And installation costs are less—no waveguide run necessary.

Ruggedness—completely watertight, built to last and last with the year-in, year-out quality performance found in all RCA Radars.

Simplicity—easy to read, easy to interpret, easy to service—easy for all hands to become proficient radar operators in a short period of time.

Let us send you free information on how RCA Small Boat Radar can help you get more efficiency at less cost in workboat operations.

RCA Radiomarine
RADIO CORPORATION OF AMERICA
RADIOMARINE PRODUCTS • 75 VARICK STREET, NEW YORK 13, N.Y.
Tmk(s) ®

RCA "Workhorses" for the Workboat Fleet

RCA Depth Recorders are sensitive, accurate navigational instruments. Record depths, warn of rocks, wrecks, other underwater hazards.

Model LAZ-17

For use on all types of commercial vessels and larger pleasure craft, RCA Radiomarine VHF Model ET-8058 Radiotelephone equipment is designed for marine communications in the 148 to 174 mc band.

Model ET-8058

To keep you in touch with home port offices, other fleet units. With Model ET-8050 Radiotelephone you talk ship-to-shore, between ships; calling and distress frequency.

Model ET-8050

UNIT RIG ROTARY TABLES . . . are mud proof

FIELD PROVEN DESIGN

On-the-job performance has proven that the triple labyrinth seal makes Unit Rig Rotary Tables mud proof. Lapped and matched spiral bevel gears assure quieter, longer, maintenance-free operation — specify "Unit Rig" for your next table! ▲ Now available in four models: S-17-½-A Short, S-17-½-A Long, S-21-A and S-27-½-A. For detailed information ask your Unit Rig representative — or write Unit Rig in Tulsa.

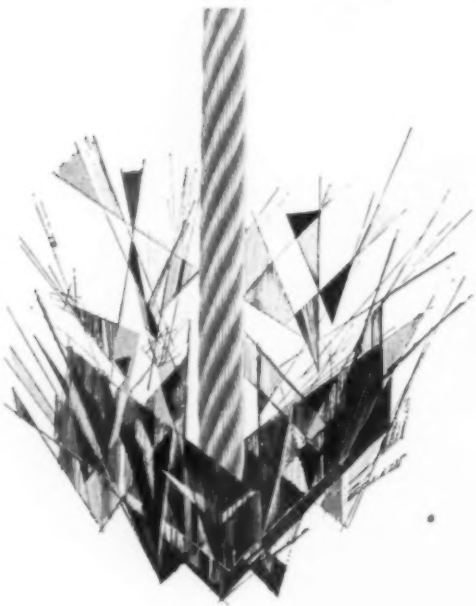
UNIT RIG AND EQUIPMENT CO.
BOX 1289 TULSA, OKLAHOMA
EXPORT SALES: MID-CONTINENT SUPPLY COMPANY
45 ROCKEFELLER PLAZA, NEW YORK 20, N. Y. CABLE — MIDUNITRIG

UNIT RIG

Stands up to **bending fatigue**

Absorbs **shock** and **impact**

Has **higher strength**



Withstands **Abrasion**

These four qualities
in Roebling Royal Blue Wire Rope
mean **longer service life!**

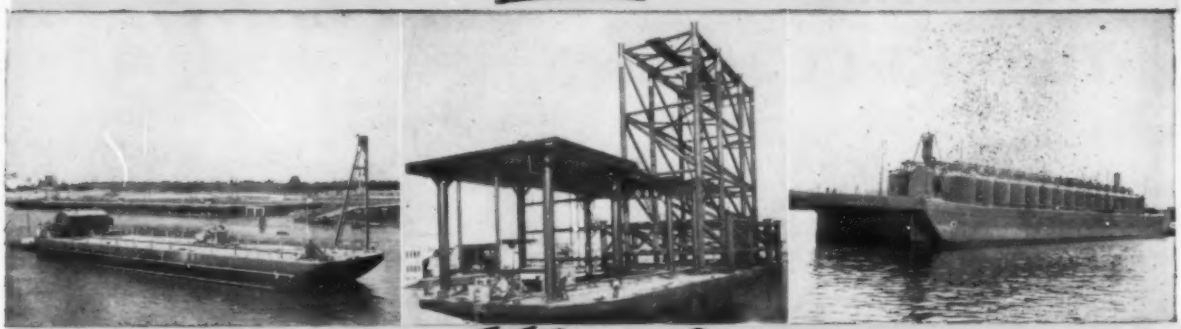
They all add up to the fact that Roebling Royal Blue will deliver more work on your job—regardless of what it is. It's as simple and money-saving as that. For full information on Royal Blue, the rope that's stronger than yesterday's strongest, talk to your Roebling Distributor or write Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities—
Subsidiary of The Colorado Fuel and Iron Corporation

Whatever you need...

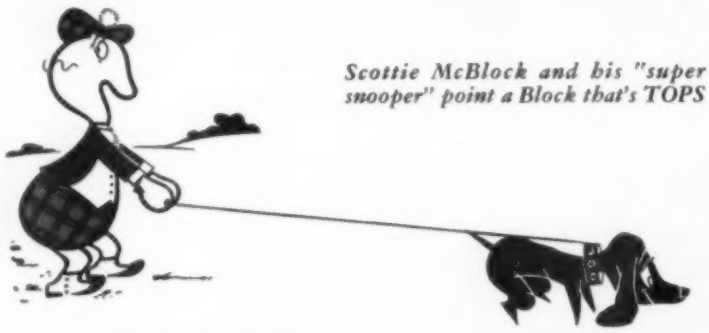
If you need it right on time...



Get hold of Higgins INC.

Box 8001 —
New Orleans 22, La.

DRILLING BARGES • DREDGES • BARGES
QUARTER BOATS • TUGS • WORK BOATS
COMMUNICATION CRAFT • TANK BARGES
DRILLING STRUCTURES • PLEASURE BOATS
STEEL FABRICATION • PERSONNEL BOATS
SEISMOGRAPH BOATS • BULK-TYPE CARGO
BARGES • MARINE REPAIRS OF ALL TYPES



Scottie McBlock and his "super snooper" point a Block that's TOPS

McKISSICK'S *STREAMLINED* TUBING BLOCK

Here's the block with the very widest range of sizes and capacities. For most efficient, trouble free handling of tubing, rods, etc.

Featuring E-Z opening guards, an exclusive McKissick feature, for quick, simple reeving, a few turns, bolts swing out. No parts removed — guards swing on extended arm to closed position and lock bolts tightened.

McKISSICK builds a "Better Block for Every Purpose"

Write for complete catalog

McKISSICK

McKISSICK PRODUCTS CORPORATION

Box 2496 Tulsa, Oklahoma

With Magcobar on your well

logging can begin on time, on schedule to save you money

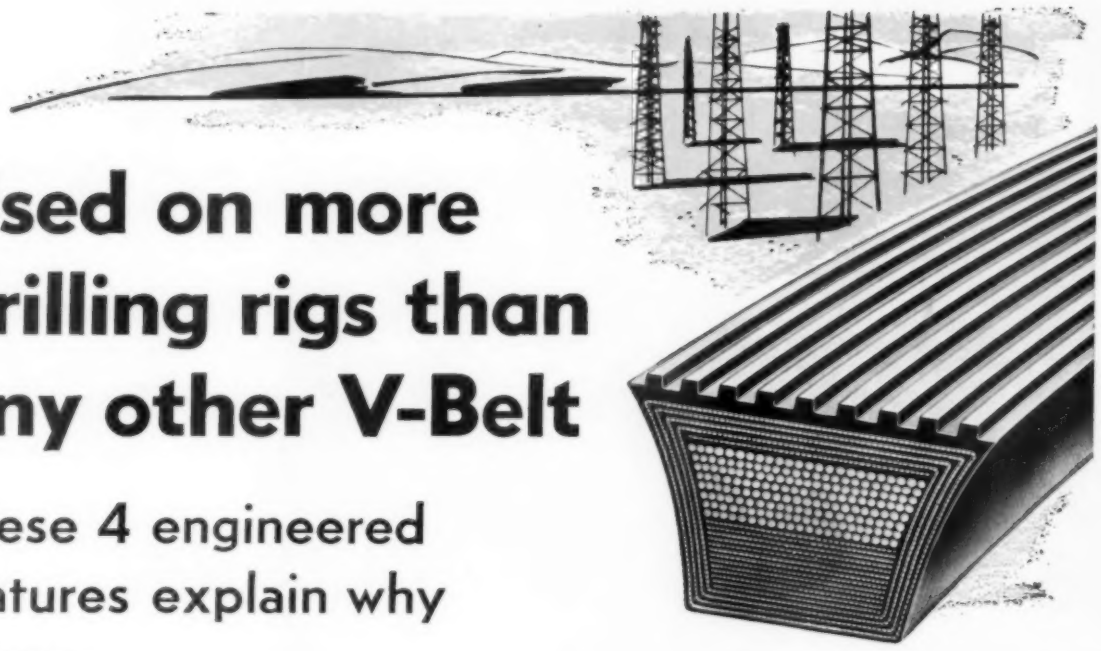
A well-planned and executed mud program can save money all along the line. For example, when the mud is properly conditioned for logging, with the proper weight, the right viscosity, correct gel strength, etc., logging proceeds on schedule without costly delay. Your well is ready for logging as soon as the desired depth is reached. When desired, mud resistivity can be controlled to improve log interpretation. To help you in both the planning and the execution of your mud program, the Magcobar team will work right along with you.

Magcobar's complete drilling mud service brings you the right drilling mud chemicals for each foot of hole. Magcobar's mud engineers are the best trained and best qualified in the mud industry. The full facilities of Magcobar can help you to lower the over-all cost per foot of hole drilled. Plan now to make full use of Magcobar's *complete* drilling mud service on your next well.

Magnet Cove Barium Corporation
Houston, Texas

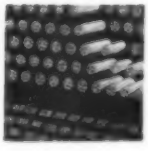
Magcobar®
Complete
DRILLING MUD SERVICE

57-101

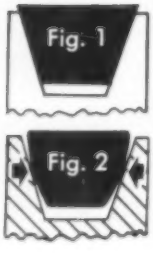


Used on more drilling rigs than any other V-Belt

These 4 engineered features explain why



1. Tougher, More Resilient Tensile Cords. Enable Rib-Top V-Belts to absorb severe pulsations of the mud pump—easily handle peak loads.



2. Concave Sidewalls (U.S. Pat. No. 1813698). Provide sure pulling power, less wear, longer V-belt life, because as belt bends around the sheave, concave sides fill out . . . become straight . . . fit sheave grooves evenly (Fig. 1). Straight-sided belts bulge at the sides when bent. Uneven contact (Fig. 2) causes uneven wear, shorter belt life.

3. Stabilizing Ribbed Top (U.S. Pat. No. 2548135). Dampens vibration . . . protects top of belt against damage . . . keeps belt running smoothly over idler-equipped mud pump drives, with no side whip.

4. Flex-Weave Cover (U.S. Pat. No. 2519590). Insures greater flexibility with far less stress on fabric. Wears longer . . . increases belt life . . . lowers belt costs . . . makes more power available to driven machine.

In oil fields around the world, drillers minimize down time and reduce belt replacement costs by *standardizing* on Rib-Tops—the V-belts *specifically developed* for mud pump drives. Yet they *pay no more* for Rib-Tops than for ordinary belts of comparable ratings. Both Standard and Super Rib-Top V-Belts are available from your supply house.

Use *Super* Rib-Top for your toughest drives

With 40% greater horsepower capacity, they handle drive overloads and shock loads easily. Increased capacity solves problems by permitting the use of narrower sheaves and fewer belts.

GATES Distributors are in the Yellow Pages

The Gates Rubber Co. • Denver, Colorado

World's Largest Maker of V-Belts

The Mark of *Specialized* Research

Gates

Gates Rib-Top Vulco Rope

DEVELOPED ESPECIALLY FOR MUD PUMP DRIVES

TPA170

WORLD'S FIRST ALL-COMMANDER AIRLINE

NEW AIRLINE SERVICE INAUGURATED FOR ARGENTINA

An airline operating over the rugged terrain of Argentina demands truly superior performance from its airplanes. After a careful study of available executive aircraft, Aerotransportes Literal Argentina, with Commander Gabriel A. Bo' as managing director, selected Aero COMMANDERS.

Commander Bo' (Argentina Air Force Ret.) said that ALA will use the 7-place Aero COMMANDERS exclusively in their operation — taking advantage of the luxurious passenger comfort, high speed and unprecedented single-engine performance at all altitudes. The ALA COMMANDER air fleet will be home-based at Rosario.

The shiny new fleet of 7-place Aero Commanders makes eight to ten flights daily from the home base at Rosario—transporting passengers and cargo to and from Buenos Aires, Mendoza, Montevideo, Cordoba, Mar Del Plata, Tucuman, Bahia Blanca and Resistencia.

The Oil Industry around the world takes advantage of Aero COMMANDER's higher speed, greater payload, and outstanding short-field performance.

The choice of men at the top

AERO Commander

560-E - 680-S

AERO DESIGN & ENGINEERING CO

TULAKES AIRPORT • P. O. BOX 118 • BETHANY, OKLAHOMA

They Say—

Call off the congressmen

"Investigators for a congressional committee come up with an accusation that certain United States oil companies are not paying what they should in corporate income taxes abroad.

"They advance the theory that it is unjust to allow these firms credit for the income taxes or royalty payments they make to foreign nations.

"What is not explained is why the oil companies are singled out for such complaints. Why not every other United States firm engaged in foreign operations? Why not cripple all such operations, if crippling of oil activity is desirable?

"Actually, no crippling of any kind is desirable. To the contrary, the Government should do what it can to encourage investment of U. S. dollars abroad for every such investment lessens the need for U. S. aid at the expense of U. S. taxpayers.

"At present, U. S. private investments abroad total 33-billion dollars. Last year 5-billion dollars was so invested. This is all to the good. The congressional investigators who are trying to harvest some political hay out of the situation ought to be told to pack their bags and leave Washington."

Editorial in the Shreveport, La., Times.

Sahara's oil reserves

"There is no question but what there are large oil reserves in the Sahara Desert. Plans for expanded exploration activity there are going ahead. These oil reserves are going to mean a great deal to France and the French companies.

"The French colonies are coming into their own as far as oil reserves are concerned . . ."

G. H. Westby, president, Seismograph Service Corp., in an announcement of plans to expand seismic service crews of Seismograph's French and English subsidiaries.

Colorado's commissioners

Dear Sir:

I just read your article concerning Rangely in the July 22 issue. I think it was a splendid article. My only suggestion would have been that mention had been made of the names of the other commissioners.

Warwick M. Downing
Chairman
Colorado Oil and Gas Conservation Commission

Editor's note: Other Colorado commissioners are H. C. Bretschneider, Prescott Eames, W. A. Dillon, and Harvey Houston.

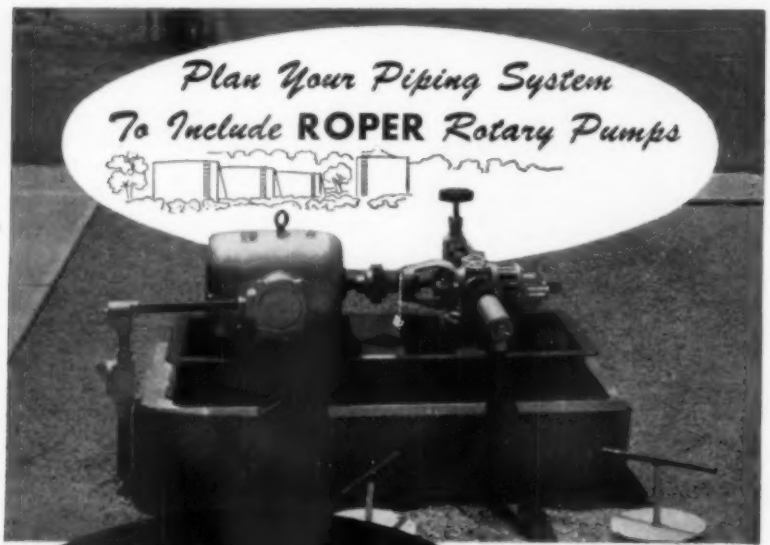
Soviet press hails turbodrill

"Soviet turbodrills received the same favorable evaluation in West Germany as they got in Oklahoma City, where representatives of many U. S. oil companies said they had to admit that 'you Russians have outstripped us.'

"The first turbodrill demonstration was made at the Wintershall company's oil fields, where a well was drilled from 1,800 to 2,400 meters. Here the turbodrill's penetration speed was three times that of the rotary drill.

"After this many companies came to our Soviet technicians with requests that we demonstrate the turbodrill for them. In one such test at a Mobil Oil field the turbodrill's penetration rate was six times that of the rotary drill.

"Our turbodrill again far outstripped the rotary drill in a test for the Brigitta



Throughout the oil world there are thousands of Roper Series F Pumps on the job. Big reason is *dependability*. Other reasons include: smooth, non-pulsating flow . . . equal size gears running in axial hydraulic balance . . . positive displacement requiring no priming . . . and importantly, four-port design. This latter feature of the Roper Series F Pump allows greater flexibility of installation . . . cuts installation time and costs. Four-port design, you see, permits 8 optional piping arrangements — 4 for CW and 4 for CCW operation. There are other Ropers in the line . . . in the pumping range and pressure range you require. Ask your distributor for all the facts . . . he'll show you how Roper can give you better service and higher efficiency in field storage, gathering line, and tank truck installations.

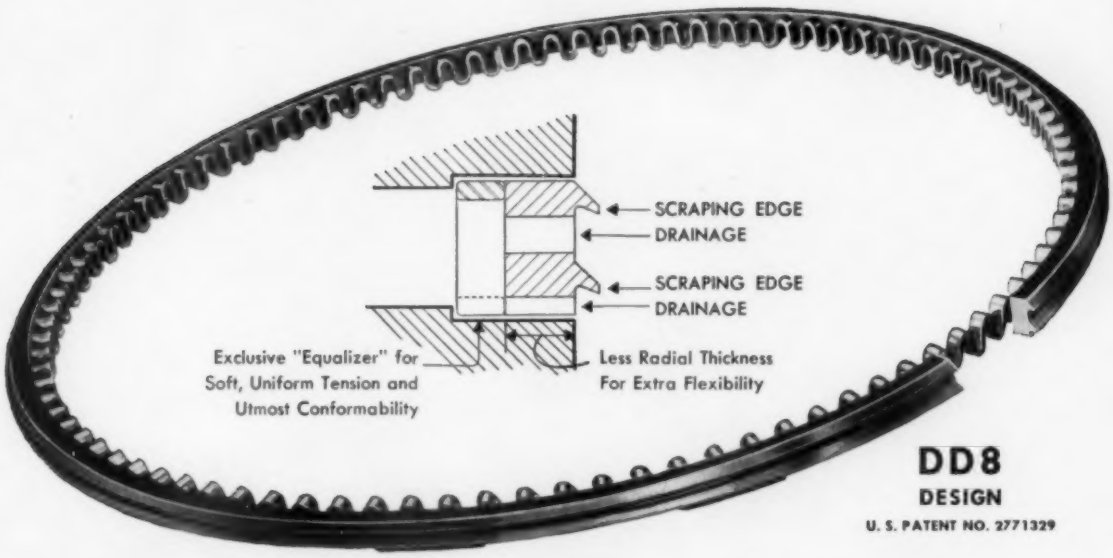
Geo. D. Roper Corporation
108 BLACKHAWK PARK AVENUE
ROCKFORD, ILLINOIS

ROPER Rotary Pumps

Sales and Service in All Oil Producing Areas

Another PEDRICK *"First"*

A Single-Piece Cast Iron Conformable Oil-Control Piston Ring with TWO Scraping Edges and Drainage Under Each!



Pedrick Conformable FORMFLEX Double-Drain Oil Ring

Pedrick's DD8 Formflex oil ring assures far better oil control, especially on pistons with oil drainage through the grooves instead of below the grooves. Three of the most important reasons are:

1. TWO oil-scraping edges.
2. TWO sets of drainage channels or slots, one under each scraping edge.
3. Exceptional *conformability* for positive contact with the cylinder wall under even the most severe conditions.

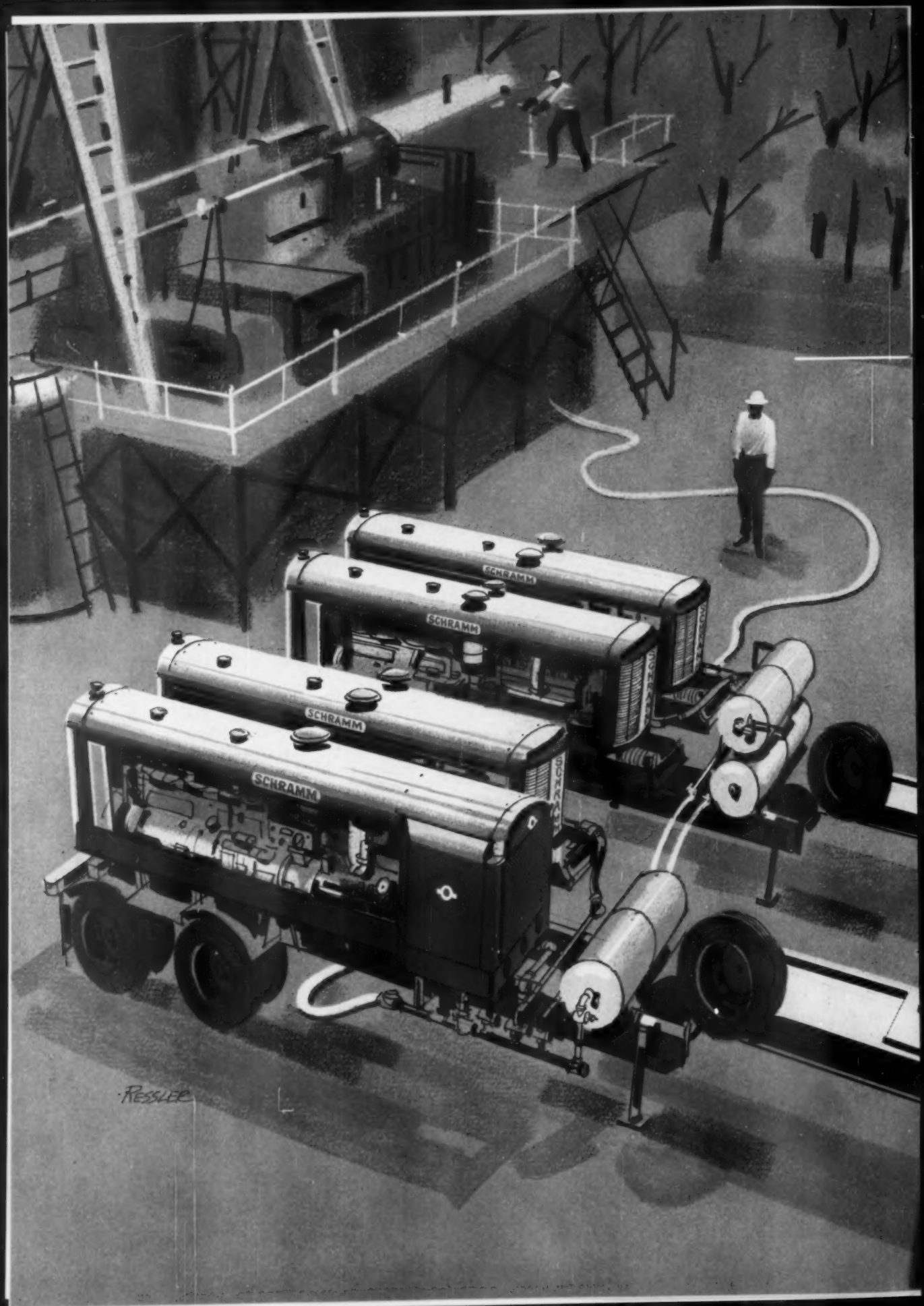
Conformability is assured because of Pedrick's exclusive "Equalizer," a special design of steel expander which exerts a uniform pressure all the way around the cast-iron cylinder-contacting ring. The radial thickness of the cast-iron ring is less also, which increases its flexibility.

The Pedrick FORMFLEX Double-Drain DD8 oil ring, therefore, provides quicker, more effective drainage, and increased performance efficiency in all piston-groove styles. It is easy to install and moderate in cost.

This is just one of a family of top-flight ring designs which Pedrick has available to assure you long dependable, low-cost engine operation. Say the word and our engineers will be glad to consult with you. WILKENING MANUFACTURING CO., Philadelphia 42 and Toronto 2.

Pedrick PISTON RINGS

PEDRICK PIONEERED *Conformable* RINGS FOR BIG-BORE ENGINES


SCHRAMM
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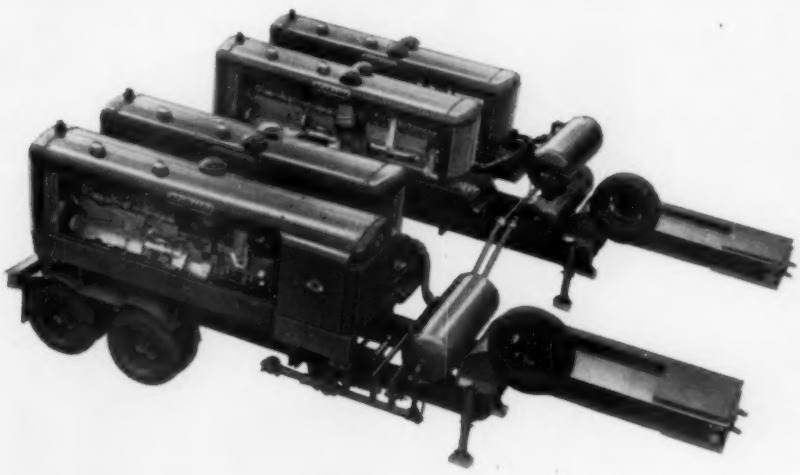
RESSLER

DRILL FASTER, CHEAPER WITH AIR



Here is a practical, portable air package designed to meet the heavy duty, continuous service requirements of drilling contractors and service companies.

1800 cfm at pressures to 275 psi or 900 cfm at pressures to 500 psi. The two-trailer air drilling package shown consists of one trailer with two Model 600 oil-field type compressors . . . the other with one Model 600 compressor and one Model 2-A oilfield booster compressor.

Minimum rig-up time . . . just hook up the hose and drill with air. These highly maneuverable, ruggedly constructed units are available in many other combinations of Schramm oilfield compressors and boosters . . . giving complete flexibility in selecting the capacities you need for pressures up to 1500 psi.

Diesel, natural gas or LPG driven. You have your choice of drive. In addition to air drilling, these units provide a highly portable source of air for pressure testing pipe lines.

Specially designed for oilfield service, Schramm Road Trailer units require a minimum of maintenance. They are designed for high interchangeability of parts.

Buy or rent. Schramm Road Trailer units are available for rent or purchase. Your dealer or supply store can give you details on our rental plan.

Write for your copy of the new Schramm Air Drilling booklet for complete information.

Schramm, Inc.

630 North Garfield Ave. • West Chester, Pa.

This man is not rusty on corrosion

(Modern techniques with glycols help him control moisture content of natural gas)

Yesterday's answer to a corrosion or dehydrating problem may not be good enough tomorrow. There may be a better way. That's why gas conditioning case histories—unsolved problems as well as success stories—continually pour into Dow labs to be studied and evaluated.

For only by analyzing what is being done in the field—and improvising and improving on accepted methods—can our technical service men come up with the best use of glycols and ethanolamines.

Often it is their job to locate the problem in the treating unit. Then, by examining the gas composition, pressures, temperatures, presence of oxygen and other factors, they must determine the most efficient and economical solution. This requires an acquaintanceship with advanced methods and techniques.

By keeping our tech service men well-polished on corrosion, Dow offers glycol and ethanolamine users a pipeline to technical information gathered from gas conditioners around the globe. A call today may save you money tomorrow. THE DOW CHEMICAL COMPANY, Midland, Mich., Dept. GD-814H-1.

YOU CAN DEPEND ON DOW

company. It was also operated at the Hanover industrial fair.

"All doubters were convinced of the tool's effectiveness. Its successful performance in West Germany attracted the attention of business circles in various countries of the world to the achievements of our Soviet science."

Sovyetskaya Rossiya, Moscow newspaper.

From a Dhofar reader

Dear Sir:

In your Oil and Gas Journal of December 24, 1956, and May 13, 1957, I found great interest in your articles on "Better Management."

As I have come across only two of these articles, I write to inquire if any more of these articles have appeared in the Journal and, if so, could you please send me the whole series . . .

T. Davies
Dhofar Cities Service Petroleum Corp.
Steamer Point
Aden, Saudi Arabia.

Editor's Note: Many thanks to subscriber Davies for his interest in the Journal series on "Better Management." Complimentary copies are being mailed to him. For those of you who wish to clip out this series, the reference pages are:

Subject and issue date—	Page
Tips on Trainee Instruction, Jan. 21	121
Tips on Training—1, Feb. 25	151
Tips on Training—2, March 18	159
The Functions of Leadership—1, April 15	145
Functions of Leadership—2, May 13	157
Some Tips on Planning, June 10	129
Tips on Decision Making, July 15	125
Mansurance—A New Management Tool, August 12	133

Complimentary copies of any of the above will be sent to Journal readers. Send requests to: Editorial Department, P.O. Box 1260, Tulsa, Oklahoma.

Training for a changing future

"Management must face responsibilities it was not required to face in the early phases of the industrial age.

"Training for management must not be based exclusively on today's practices. We believe, both because of the increasingly complex technology of American industry and because of the problem-centered approach and discipline to science, that training in mathematics, physics, science, and engineering is a sound basis on which to build an education for management.

"Our aim must be to set up programs which will serve young men 5, 10, and more years in the future. This means the development of a sense of the dynamic, and understanding of the constant change in American life, and an appreciation of the evolving economics of our free society."

E. P. Brooks, dean, School for Industrial Management, Massachusetts Institute of Technology.

Naval reserve proposal hit

"The bill proposed by Representative Vinson (Carl Vinson of Georgia, chairman of the House armed-services committee) to set up another Naval petroleum reserve to include San Nicolas, San Miguel, and Price islands is merely an effort to get around the rejection of the Navy's previous request for funds to drill for oil and gas on San Nicolas Island.

"It is opposed without question by the Western Oil and Gas Association. We believe in the development of oil resources by free, competitive private enterprise and not by government agencies."

Felix Chappelett, vice president and general manager, Western Oil and Gas Association.

GET NEW WELDER PERFORMANCE FROM YOUR OLD MACHINE AT ½ THE COST OF A NEW MACHINE

BEFORE "LINCONDITIONING"

AFTER "LINCONDITIONING"

with
"LINCONDITIONING"
Lincoln Factory Rebuilding

GUARANTEED PERFORMANCE

New machine guarantee goes with every remanufactured welder.

LOW COST

Cost of "Linconditioning" is less than half the price of a new machine.

PRECISION REPLACEMENT PARTS

All parts are reconditioned and returned to new product standards or are replaced with new parts.

MORE INFORMATION

Learn how "Linconditioning" can cut your repair and replacement cost. Details in Bulletin 480-4. Write on your letterhead to

THE LINCOLN ELECTRIC COMPANY
Dept. 5124 • Cleveland 17, Ohio
The World's Largest Manufacturer of Arc Welding Equipment

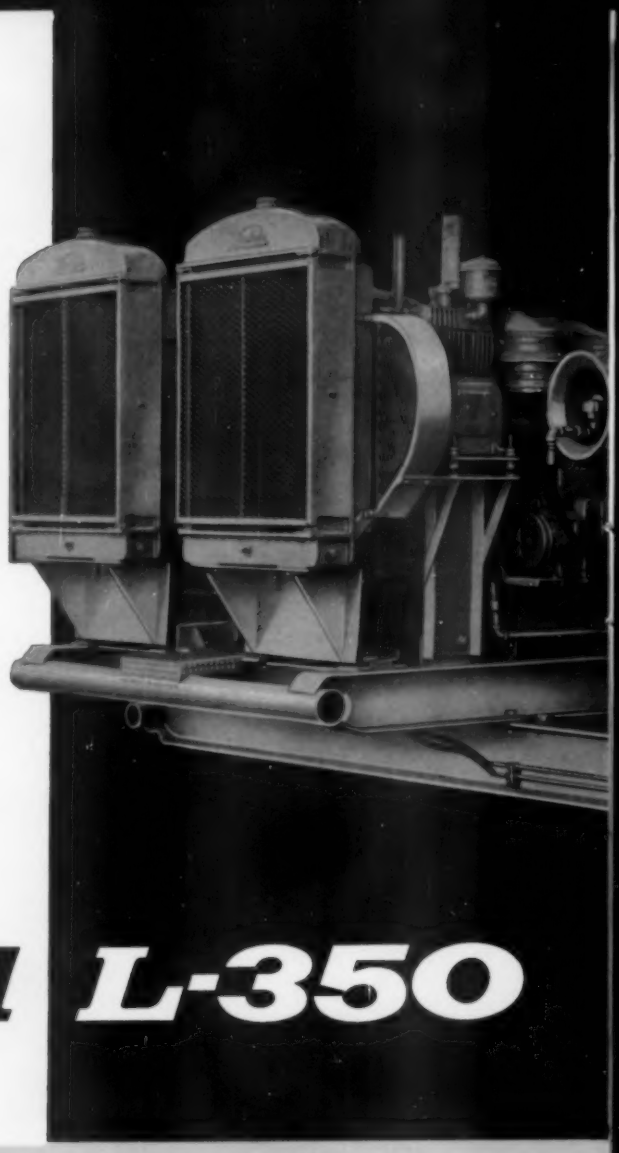
NEW DESIGN!

NEW ENGINEERING!

tailored to fit your needs

THE *NEW*

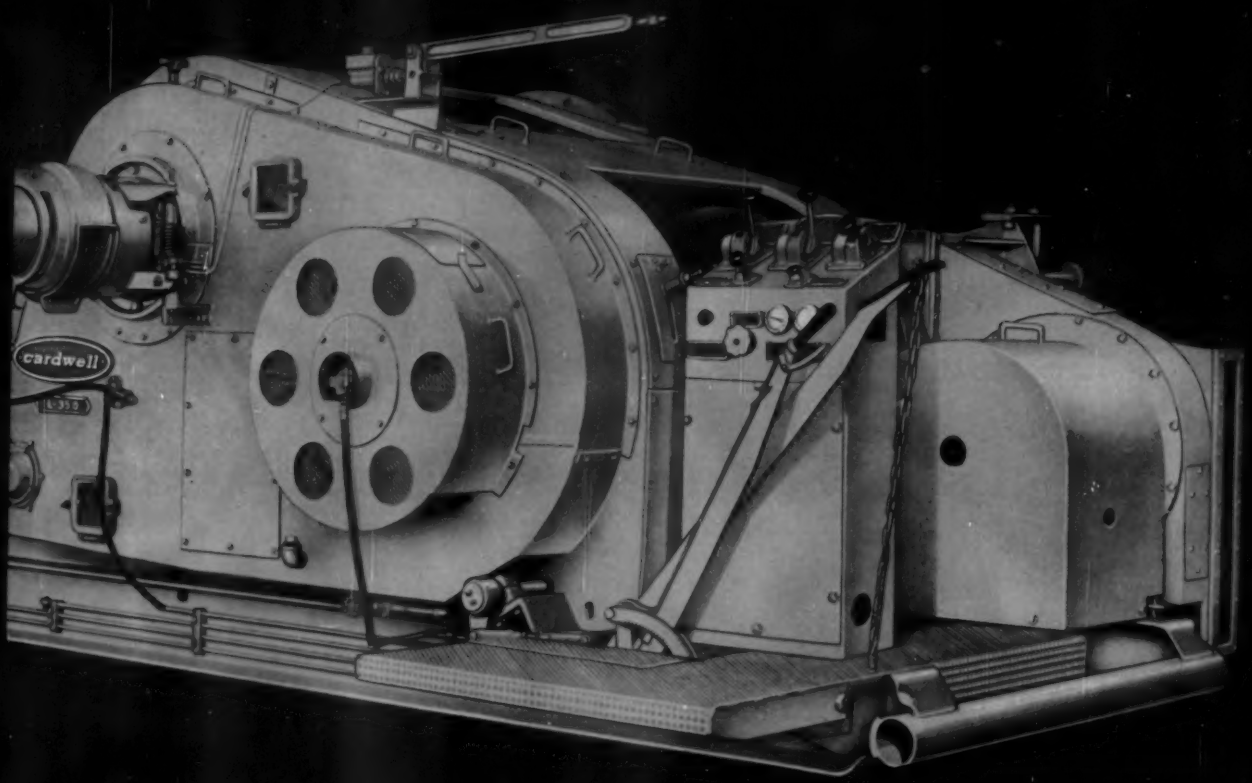
cardwell L-350



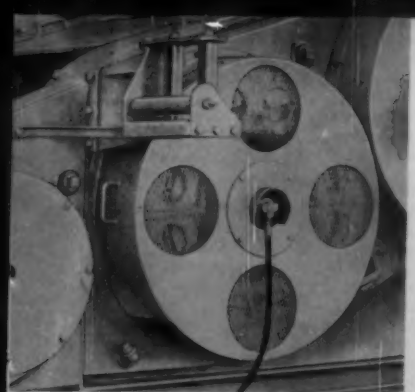
The new Cardwell L-350 is a compact single or twin engine draw works using plate frame construction to achieve a high strength-to-weight ratio. All drives are oil bath lubricated for longer chain life. Here's an extremely versatile unit that is readily adaptable to various trailer mountings as well as conventional skid masts. Single lever controls are centralized in a forward mounted control panel. The safety factor is increased by allowing the driller full view of all drilling operations. An optional sand line drum is offered that does not require any main frame changes. The Model L-350 has a nominal horsepower rating of 350.

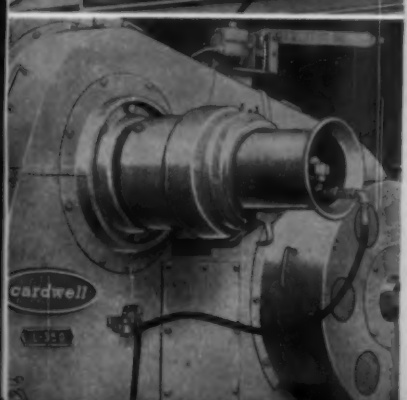
Job-tailored Features

- PLATE-FRAME CONSTRUCTION for high strength-to-weight ratio.
- CHAIN DRIVES—all oil bath lubricated.
- SIMPLIFIED SINGLE LEVER CONTROLS for safe, convenient operation.
- FRICTION CLUTCHES — Fawick's newest design — exterior mounted.
- HYDROMATIC BRAKE (optional) 15-inch double rotor mounted with a separate Friction Engaging clutch.
- ROTARY BRAKE—Air Controlled—quickly and smoothly stops and holds rotary table.



TORQUE CONVERTER DRAW WORKS





Externally mounted clutches

Maximum operating efficiency is provided by Fawick VC (ventilated type) clutches mounted in each end of a Double End Drum Drive.

Oil bath chain drives

Oil bath lubrication to all drives. This efficient oiling system assures positive lubrication and long life for all chain drives.

FOR FULL INFORMATION CALL YOUR

NEAREST CARDWELL REPRESENTATIVE

cardwell MANUFACTURING COMPANY

BOX 2001, WICHITA, KANSAS, U.S.A.

C-4-7

You can't beat R/M VEE-SQUARE* for heavy duty reciprocating service

*Patented

Where conditions in the oil fields are toughest — on mud pumps, steam hammers, high-pressure lubricators, and special hydraulic equipment — R/M Vee-Square® outperforms them all. It has positive nonyielding properties . . . assures automatic sealing . . . needs no sensitive gland adjustments . . . and permits unrestricted use of gland pressure.

Patented R/M Vee-Square has these special built-in features:

1. Gland pressure is absorbed by the solid square section. The packing can not roll or ride the rod.
2. Automatic sealing is assured by the V design.
3. Blow-by is prevented by the soft rubber cushion between the rings.

R/M VEE-SQUARE KEEPS NEW RODS NEW LONGER

For complete information on R/M Vee-Square, write today for booklet shown

R/M MAKES A COMPLETE LINE OF MECHANICAL PACKINGS—including Vee-Flex, Vee-Square, Universal Plastic, and "versi-pak"®; GASKET MATERIALS, "TEFLON"† PRODUCTS. SEE YOUR R/M DISTRIBUTOR.

† Du Pont trademark

R/M **PACKINGS**

RAYBESTOS-MANHATTAN, INC.

PACKING DIVISION, PASSAIC, N.J.

MECHANICAL PACKINGS AND GASKET MATERIALS

FACTORIES: Passaic, N.J.; Bridgeport, Conn.; Manheim, Pa.; Neenah, Wis.; No. Charleston, S.C.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Mechanical Packings • Asbestos Textiles • Industrial Rubber • Engineered Plastics Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks Clutch Facings • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

CALENDAR

AUGUST

26-28 Seventeenth annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

28-30 Instrument Society of America, International Symposium on gas chromatography, Kellogg Center, Michigan State University, East Lansing, Mich.

SEPTEMBER

3-5 Pacific Coast Gas Association convention, Fairmont and Mark Hopkins Hotels, San Francisco.

5-7 New Mexico Geological Society, eighth annual field conference, southwestern Colorado.

8-13 American Chemical Society, 132nd national meeting, New York City.

9-10 Independent Natural Gas Association of America, annual meeting, Shamrock Hilton Hotel, Houston.

9-11 American Institute of Electrical Engineers, conference of the petroleum industry committee, Sheraton Hotel, Philadelphia.

11-13 National Petroleum Association, fifty-fifth annual meeting, Traymore Hotel, Atlantic City, N. J.

12-14 Ardmore, Okla., Geological Society, Criner Hills field conference, Lake Murray Lodge, Ardmore, Okla.

19-21 Rocky Mountain Oil Show, fairgrounds, Casper, Wyo.

20 Southern Gas Association, dispatchers' round-table conference, Baker Hotel, Dallas.

20 Southern Gas Association, compressor station round-table conference, Baker Hotel, Dallas.

22-25 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Mayo Hotel, Tulsa.

23-25 American Society of Mechanical Engineers, fall meeting, Statler Hotel, Hartford, Conn.

25 Natural Gasoline Association of America, regional meeting, Northern Hotel, Billings, Mont.

26-27 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

26-27 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, Roosevelt Hotel, New Orleans.

30-Oct. 2 American Oil Chemists' Society, 1957 fall meeting, Netherland Plaza Hotel, Cincinnati.

OCTOBER

1-2 Texas Mid-Continent Oil and Gas Association, thirty-eighth annual meeting, Texas Hotel, Fort Worth.

1-4 National Association of Corrosion Engineers, north-central region, Sherman Hotel, Chicago.

1-4 National Association of Corrosion Engineers, south-central region, municipal auditorium, Oklahoma City.

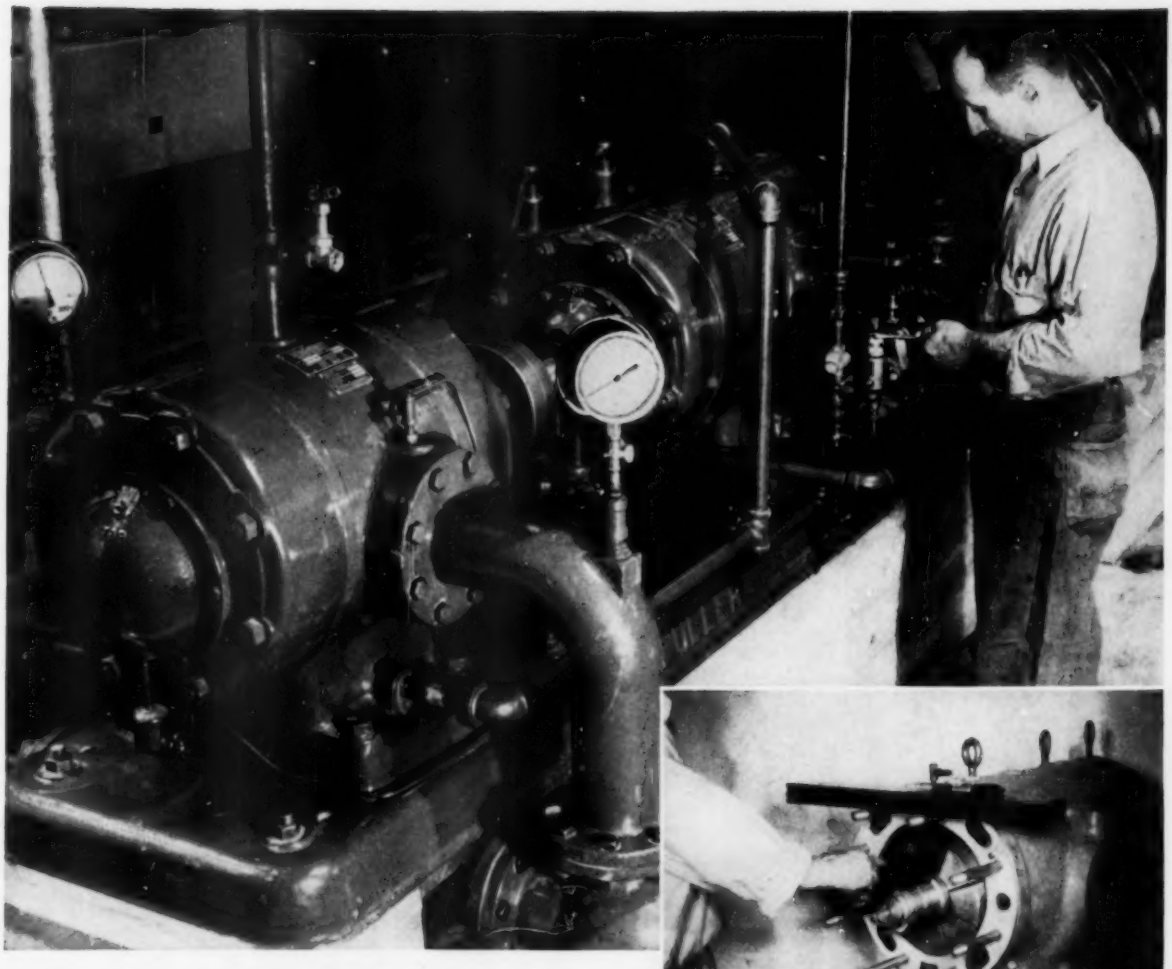
2-4 Golden Trend Oil Show, Pauls Valley, Okla.

6-9 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fall meeting, Adolphus, Baker, and Statler Hilton Hotels, Dallas.

7-9 National Electronics Conference, thirteenth annual meeting, Hotel Sherman, Chicago.

7-9 American Gas Association, annual convention, Kiel Auditorium, St. Louis.

7-11 American Institute of Electrical Engineers, fall general meeting, Morrison Hotel, Chicago.



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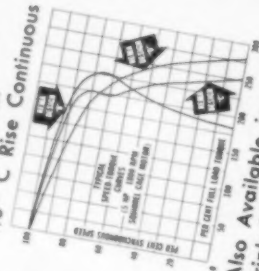

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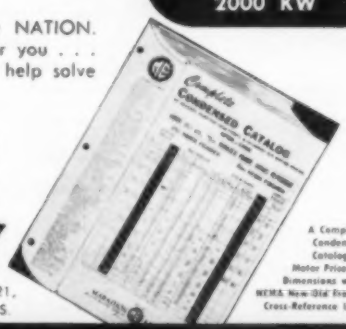

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10-11 California Natural Gasoline Association, thirty-second annual fall meeting, Huntington-Sheraton Hotel, Pasadena.

10-12 American Society of Mechanical Engineers, American Institute of Mining, Metallurgical & Petroleum Engineers, fuels conference, Chateau Frontenac, Quebec.

10-13 Louisiana Gulf Coast Oil Exposition, Lafayette, La.

13-15 American Association of Oilwell Drilling Contractors, seventeenth annual meeting, Mayo Hotel, Tulsa.

13-19 OIL PROGRESS WEEK.

15-16 Gas Measurement Institute, sponsored by the University of Kansas, American Legion Hall, Liberal, Kans.

17-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, Southern California petroleum section, fall meeting, Biltmore Hotel, Los Angeles.

17-19 Four Corners Geological Society, second field conference, Gallup, N. M.

18 American Institute of Chemical Engineers, South Texas section, twelfth annual technical meeting, Moody Convention Center, Galveston, Tex.

20-22 National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Peabody, Memphis.

23-25 National Association of Corrosion Engineers, western region, seventh annual conference, U. S. Grant Hotel, San Diego, Calif.

23-25 National Association of Corrosion Engineers, seventh biennial Permian basin corrosion tour, Midland-Odessa area, Texas.

24-25 Rocky Mountain Oil and Gas Association, midyear meeting, Northern Hotel, Billings, Mont.

24-25 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Rufus Garrett Hotel, El Dorado, Ark.

25 Natural Gasoline Association of America, southern regional meeting, Washington-Youree and Captain Shreve Hotels, Shreveport.

27-29 Independent Petroleum Association of America, annual membership meeting, Statler Hilton Hotel, Dallas.

31-Nov. 1 American Association of Petroleum Geologists, Mid-Continent regional meeting, Education Building, Fairgrounds, Tulsa.

NOVEMBER

3-8 Society for Nondestructive Testing, second international conference, Hotel Morrison, Chicago.

6-8 Gulf Coast Association of Geological Societies, seventh annual convention, Roosevelt Hotel, New Orleans.

6-8 Society of Automotive Engineers, national fuels and lubricants meeting, Hotel Statler, Cleveland.

11-14 American Petroleum Institute, thirty-seventh annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

12-14 National Association of Corrosion Engineers, northwest region fall meeting, Penn-Sheraton Hotel, Pittsburgh.

22 Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

DECEMBER

1-3 Interstate Oil Compact Commission, annual meeting, Tulsa.

1-6 American Society of Mechanical Engineers, annual meeting, Statler Hotel, New York.

8-11 American Institute of Chemical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

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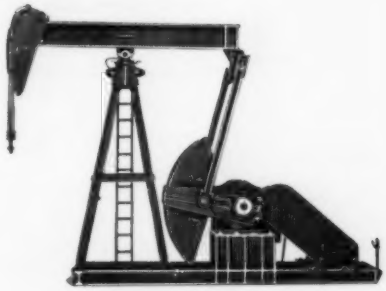
Unlike the mule with its obstinate temperament, the Le Grand 'L' Series Pumping Units are paragons of virtue.

There is a unit available to meet every oilwell mechanical pumping need (from 3,000 lbs. to 30,000 lbs. polished rod load and 24″ to 108″ stroke). Incorporating the most up-to-date design features Le Grand Pumping Units are the result of long practical experience in the Oil Fields of the World.



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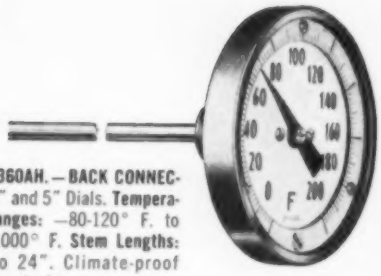

TYPE 6360AH. — BACK CONNECTION. 3" and 5" Dials. **Temperature Ranges:** —80-120° F. to +200-1000° F. **Stem Lengths:** 2½" to 24". Climate-proof stainless steel case.

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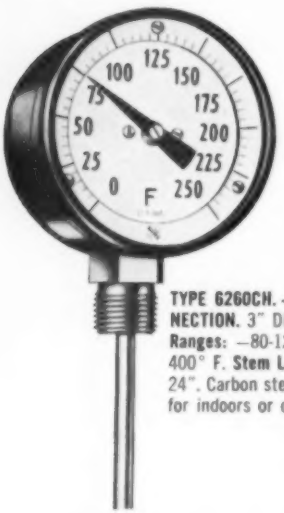

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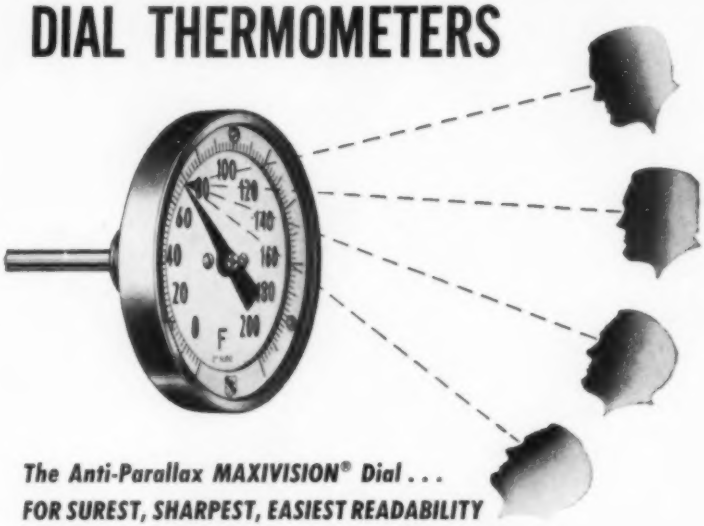

The Anti-Parallax MAXIVISION® Dial . . .
FOR SUREST, SHARPEST, EASIEST READABILITY
. . . Is Available Only In 'American' Thermometers

Nowadays fewer men are required in power and processing plants to inspect operations, so it is more important than ever to have observation points handy for them. 'American' Bi-Metal Dial Thermometers, installed at important check points, eliminate frequent trips to the control house. Inspectors can observe variations in process temperatures "on the spot" and take steps to effect corrections.

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The Maxivision dial is a split-level dial with pointer set on the same plane as the outside raised ring that carries the graduations. No perspective effect, no parallax! Readings are sure, sharp and accurate at a glance!

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PHONE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR for assistance in selecting the types of 'American Bi-Metal Dial Thermometer best suited to your needs. He can provide separable sockets in al materials and sizes normally required.

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the OIL AND GAS JOURNAL

TULSA, OKLAHOMA

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JOURNALLY SPEAKING

Real Cool, Man

WE ALWAYS accuse Frank Gardner, our exploration editor, of scheduling his Canadian issue in August to get an excuse to visit north of the forty-ninth parallel during the season when the weather in Oklahoma is, well, typical of Oklahoma weather in this season.

This year, however, Frank was a little bit frustrated. He was up that way this spring to line up some authors and did such a good job that he had no reason to go back during the vacation season, and had to spend the dog days under an air conditioner editing other people's copy.

But he's not at all disappointed with the results. He really lined up an all-star cast of Canadian authors to write on their favorite subject — Canadian oil. He's pretty pleased with the array of material he has assembled for this issue, and is particularly proud of that rainbow-hued foldout doohicky he calls a formation evaluator.

You really will find a lot of good, solid Canadian dope in this issue, ranging from George Weber's forecast of what's going to happen in refining to detailed statistics on what's already happened as a result of drilling.

In fact, Frank got so enthusiastic about the whole thing that, with customary optimism and abandon, he reared back and coined a slogan—Oil and Gas Unlimited Exclamation Point. And, as you can't help but notice, he plastered this all through the issue. In doing this he was kinda out on a limb, because he had his slogan in type before it was known whether or not the U. S. Government would put a limitation on Canadian oil.

Frank had another frustration, too. He had his heart set on putting a beautiful four-color photograph on the front cover of this issue. He scrounged all around Canada and collected enough masterpieces of camera art for a salon exhibit.

But Dudley Johnston, our art director, was not impressed. One by one he rejected all of them, for reasons known only to an art director. A geologist can't argue art with an artist, and Frank lost every round.

"What are we going to do for a cover?" asked Frank dejectedly.

"Very simple," said Dud. "I'll draw one myself."

So he did. That blue-and-white mountain on the cover may not look like any photograph you ever saw, but it certainly gives a cooling effect these hot days.

What! Spoil Our Lunch?

IT'S PRACTICALLY a bromide in oil circles that one trouble with the industry's public relations is that oil men "just talk to themselves" and don't do enough to explain the nature of their business and its problems to the general public.

Now comes somebody who proposes something specific that can be done about it. And boy is it drastic!

He wants to abolish petroleum clubs.

He starts with the major premise that practically everybody eats lunch, and the minor premise that a good many businessmen eat lunch in businessmen's luncheon clubs.

Now, he says, if there were no such things as petroleum clubs, oil men would eat lunch at other downtown clubs where they would rub elbows and make conversation with other types of business and professional men. In this way they could spread the true gospel of oil.

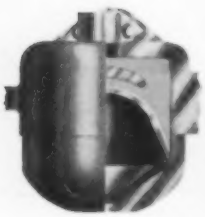
But where a petroleum club is formed in a town—and there are a couple of score of them now—he says the clannish oil men all pull out of the other clubs and flock together at the petroleum club. There they can cry on each other's shoulders about how nobody understands them, but they aren't doing anything to correct the situation.

Very poor public relations, the man says.

Wait a minute, mister. You're going too far. A petroleum club is about the only haven a harried oil man can find these days to get away from criticism and abuse. Don't deny him this one last solace.

Before we abolish petroleum clubs, let's see if there isn't some other way to solve this problem. Maybe the real public-relations problem lies entirely outside of the luncheon-club circle.

—Henry D. Ralph.



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The Welex 1-11/16" Link-Jet, the newest of the Welex jet perforators, has been designed to give more penetration with less debris than any other type tubing gun available. Engineered for use in small I. D. casing liners and tubing, the advantages of the Welex Link-Jet are many:

- Forty percent less debris than any type tubing gun.
- Greater penetration and hole size than any fixed-type tubing gun.
- Extreme flexibility permits passage through tight spots in casing and tubing.
- Elimination of debris from perforation.
- Bottom firing insures sure detonation of string.
- Unique design permits interval to be skipped at minimum expense.
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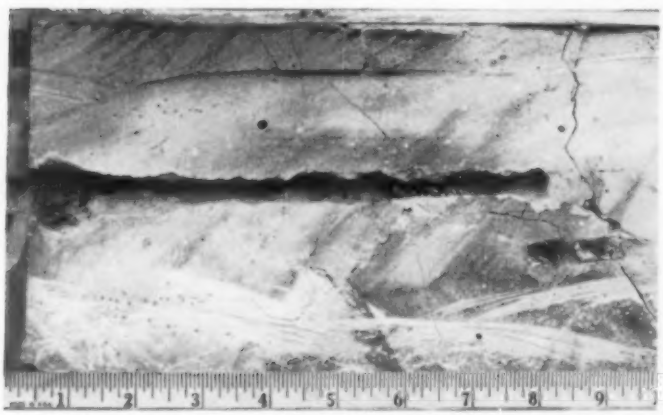

Welex 1-11/16" Link-Jet shot in ½" of fluid into ¾" steel plate and 14-day cement to give .40" entrance hole and 8" penetration.

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Imports control puts the bee on proration

THE protests of individual importers against inequities in the administration's formula for limiting crude-oil imports are parallel with the troubles state governments have always had with proration.

With imports, as with domestic production, the policy has been set that volume must be regulated in the interests of conservation, orderly development, and economic equities.

Any formula to do this always hurts some people's immediate interests, and the aggrieved parties generally use every possible means to get the formula changed. It took years of experiment and litigation to shape state conservation systems into reasonably acceptable form.

NOW A NEW CHALLENGE faces the producing states. With the proration principle extended to imports, the states have a responsibility to make that principle function effectively at home.

The entire justification for limiting imports is that excessive crude supplies threaten to injure conservation, exploration, and the general health of the domestic industry. But the industry can be injured just as badly by excessive supplies from domestic sources.

No longer can producers and state authorities conveniently blame all their troubles on imports. There is now no excuse for tolerating waste by producing oil beyond the market's capacity to use it. The total imports volume for the next many months is definitely known. Now the states must tailor their own output to the share of the market assigned them if they are to get any benefit from the imports limitation.

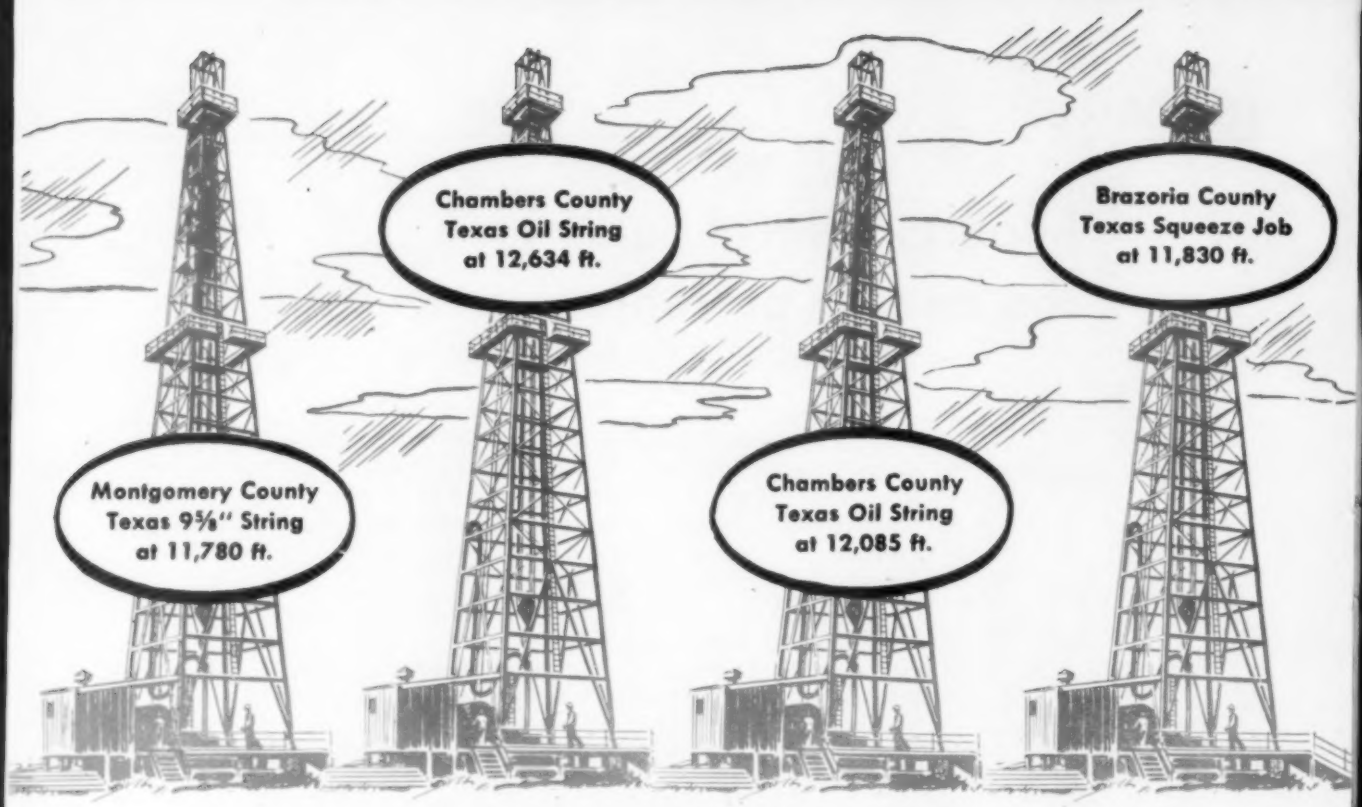
For the past several years the attitude of too many state officials was that any tightening of producing regulations would only invite more low-cost foreign crude. The result was not only excessive output but deterioration and obsolescence of the conservation program in certain areas.

Evidence of this is the purchaser proration currently in effect in a number of places. Now that imports are no longer an unknown quantity, the states can cure this by giving serious heed to actual market demand. In the same way they can also cure other troubles, such as unconnected wells.

ON OTHER SCORES, TOO, conservation regulations need reexamination. Washington limited imports on the premise that this would stimulate exploration and foster conservation of existing reserves.

The state governments have an obligation to bring this about. If they don't, there is an implicit threat that federal concern with the condition of the oil industry may be extended beyond limitation of imports.

Some states are currently considering proposals for revising their allowables formulas and other conservation practices. This should be expedited. The fact that imports are under limitation makes it doubly important to keep practices in tune with the long-range needs of the industry and of the consuming public.



AS TEXAS GULF COAST WELLS GET DEEPER AND HOTTER

'Starcor' Gives Outstanding Performance

...NOW, AS IN 1936

Select Cement to Fit the Job!

● Back in 1936, few wells were drilled below 7500-8000 ft. In some fields, temperatures ranged from 185 to 200°F, with high pressures. Pumping equipment was a long way from what it is today. Operators were often hard pressed to get a good cementing job with "common" cement.

A slow-setting cement was needed—'STARCOR' SLOW-SETTING OIL WELL CEMENT met that need, met it well, as shown by the fact that wells cemented with 'Starcor' a generation ago are still producing, the original cementing jobs holding tight.

Equally outstanding is today's 'Starcor' performance at the greater depths made possible by improved equipment and methods. In the deep, hot Texas Gulf Coast wells, for example (typical jobs, listed above), 'Starcor' is performing perfectly, adding a new chapter to a distinguished service record.

Lone Star offers you four great cements: LONE STAR Cement, standard of highest quality for half a century...'INCOR'*, America's FIRST High-Early, Sulphate-Resistant Cement ...'STARCOR'* Slow-Setting Oil Well Cement ...'TEXCOR'* Deep Oil Well Cement. Select the one that fits your job—the extra quality margin is important to you.

*Reg. U.S. Pat. Off.

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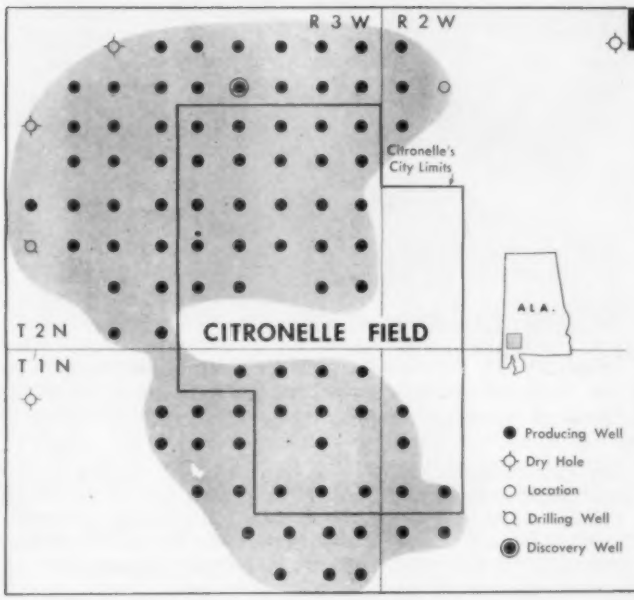
the OIL AND GAS JOURNAL

August 19, 1957



Citronelle Box Score

Production

- 97 producers in 2 years.
- Per well average has dropped 70 bbl. to 144 bbl. daily in the last year.
- Cumulative production is 4 million barrels. Reserves are estimated at 150 million barrels.

Drilling

- If it weren't for workover jobs only two rigs would be busy in the field. Development drilling is near a standstill.

Citronelle: Ailing at an Early Age

- This 2-year-old field has been a big disappointment. The oil is there, but producing it economically is the problem. Tight sands and rapidly dropping bottom-hole pressures are plaguing operators in the field.

- Fracturing has been tried in a few wells, but results are inconclusive. Unitization and secondary recovery may be the answer to Citronelle's problems.

Joe Reilly
Gulf Coast District Editor

CITRONELLE, Ala.—Citronelle field, which observed its second birthday just last week, already is acting like a tired old man.

Having set off the greatest oil boom in Alabama's history, this sleepy little town seems about to drop off again into a deep slumber. Actually, Citronelle—one of the few modern-day boom towns in the Deep South—was never fully awakened by the discovery of oil in its back yard.

Two years ago townspeople blinked with disbelief when oil landmen swarmed in to offer as much as $1,000 an acre for leases on the surrounding hillsides. They accepted the offers graciously, then sat back to await the wealth that finally would flow from deep beneath the sticky red clay which had been so stingy in the past.

Now, in retrospect, one of the townspeople will tell you, as if to prove what he knew all along: "I wouldn't give you $50 for one of them damn wells, the way they're paying off."

What's happened to Citronelle? That's a question bandied about the oil country as far north as Pembina. If Citronelle fails, then a large part of the South will be even less inviting to wildcatters in the future.

Citronelle is not a failure, of course. It holds proved oil reserves estimated officially at about 150 million barrels. But, to date, it is definitely a disappointment.

1. The Problems

Sands are tight. . . . Production trouble started soon after August 16, 1955, when oil was discovered in the Zach Brooks Drilling Co. 1 Donovan, just north of town. The oil-bearing Rodessa sands were tight and somewhat unpredictable. As more wells were drilled, bottom-hole pressures started dropping. Before long, production began to fall.

Symptoms: Idle pumps and stacked sucker rods point to trouble. Some dually completed wells are now pumping from only one zone.

Ready if needed: Gulf Oil Corp., major operator in the field, has a big supply of casing and tubing at Citronelle. Some of it may not be needed.

Obviously, Citronelle was a "problem field." There was plenty of oil there. But the task of getting it to the surface would be costly and tedious. Because of economic limitations much of the oil would remain in place awaiting better production methods or an abrupt change in the cost-price ratio of crude.

Just how much oil can be produced economically will not be known for some time. Operators now are experimenting with various production stimulants, results of which are still inconclusive.

Although the field has not been fully developed and is only roughly defined, there's already talk of a secondary-recovery program to bolster production. Without it, some fear that the center of the field will never be drilled.

Gulf Oil Corp., major operator at Citronelle, has taken the lead in trying to get a bill through the Alabama Legislature to permit unitization of the field. In the meantime, Gulf has idled its rigs there—perhaps only temporarily—while its engineers make a thorough analysis of the defiant producing formation.

Pressure drops . . . While worried over the extremely low porosity and permeability, operators are much more concerned with the rapidly falling bottom-hole pressure.

The field had been in production scarcely a year when the State Oil and Gas Board sharply reduced allowables because of an alarming drop in pressures. The order cut maximum output of the upper Rodessa zone from 300 bbl. to 200 bbl. daily per well. Allowable of the lower zone was reduced from 200 bbl. to 150 bbl. daily.

The cut was intended to be for only a 90-day trial period, but allowables have never been raised to their former level.

Since the original cutback the oil and gas board has been conducting a field-wide study of bottom-hole pressures. Results of the survey have not been disclosed.

One Gulf official estimates that bottom-hole pressure in the average well has dropped roughly 1 lb. for each 50 bbl. of oil produced. He revealed that the pressure has dwindled to an average of about 2,700 psi. in new and old wells alike. This compares with an original bottom-hole pressure of about 5,000 psi.

Development lags . . . Despite the early symptoms of approaching trouble, Citronelle boomed merrily along for more than a year. Joining Gulf and Zach Brooks in developing the field were Trans-Tex Drilling Co., General American Oil Co. of Texas, Magnolia Petroleum Co., and several independents.

At one time—as recently as last January—there were 13 rigs operating in the Citronelle area. Last week only two rigs remained at work on new locations although several others were engaged in the seemingly endless task of workovers.

In the past few months most of the rigs which had been drilling at Citronelle have been stacked or moved to Soso field in Mississippi. Despite the few dry holes far out on the perimeter, nobody really knows how big the field is.

There are persistent reports that several proved locations near the center of the field may never be drilled, and at least one company is said to have offered compensatory royalty rather than fulfill its drilling obligations.

A year ago, Dr. Walter B. Jones, state geologist, was predicting that the value of Citronelle's oil reserves might total $3 billion or more.

"There should be 200 to 300 wells when development is complete," he told the Alabama Legislature. He also forecast that 3 to 5 years probably would be required to complete development of the field. Now, with development drilling almost at a standstill, the field has 97 producers. And some of them may not pay out.

Costs are high . . . Wells in the Citronelle field produce from a series of deep sands between 10,850 and 11,500 ft. in the Lower Cretaceous. Because of the depth, wells cost an estimated $200,000 to $300,000 each (OGJ, June 4, 1956, p. 90).

Further complicating the economics of Citronelle is the fact that state law requires 40-acre spacing. With such relatively close spacing operators are discouraged from drilling any deeper. In recognition of that fact, some of the royalty owners are try-

ing to get a law passed to authorize 160-acre spacing for wells below 12,500 ft.

Word around town is that several independent operators would be interested in drilling a Smackover test in this area if the more liberal spacing bill becomes law.

Development costs at Citronelle have barely begun when a well is completed. Some of the early wells, though they flowed at first, were put on pump by the end of their first year. In recent months most wells were put on pump upon completion.

In some parts of the field wells are dually completed, roughly doubling the tubing and pump costs. But recently Gulf has discontinued production from one zone in about a dozen wells which had been dually completed. Stacked sucker rods and idle pump jacks can still be found as evidence of failing wells.

Gulf also has experienced trouble with a water sand between the upper and lower production zones. Pressure in the water sand is about 2,000 psi. greater than that in the producing formations.

2. Fracturing May Help

Booster steps . . . Very early in Citronelle's oil history operators started using various production stimulants, all of them costly. Acidizing has helped "a little," but fracturing has become much more common.

It's too early to determine the results of fracturing, although fragmentary records look promising. Through July of this year 15 Citronelle wells had been fractured, and all of them showed a notable gain in production following treatment. Since most of the frac jobs were done since spring, results to date are inconclusive.

However, two wells were fractured last year and one early this year. They offer some idea of what might be expected from more recent jobs.

Last September General American's 1 Stagg Unit No. 1 was fractured on completion, and it has consistently made its allowable of 200 bbl. a day.

Magnolia's 1 Moorer was fractured last year after its production reportedly had dropped to only 51 bbl. daily. Immediately after fracturing, it produced at the rate of 200 bbl. a day. Production again dwindled, dropping to 85 bbl. a day in July. After a second frac job the well was gaged at 310 bbl. per day on pump.

The third example of possible significance, Gulf's 1 Citronelle Unit 16, was fractured last January. Records show that production rose from 30 to 120 bbl. a day, and several months later the well was still capable of producing 90 bbl. daily.

Oldtimer: L. M. Williams, who lives 6 miles south of Citronelle's discovery well, has heard about oil in Alabama throughout most of his life. He once owned the land where a shallow test was drilled 60 years ago. Williams' present farm may eventually prove productive, but no one has drilled that far south.

On the basis of such scanty but encouraging evidence operators are turning more and more to fracturing. Since June 1 four Citronelle wells have been fractured on completion.

Yet, even the companies specializing in frac work will tell you they have no cure-all for Citronelle. First, fracturing a well, including rig time, costs about $10,000. Secondly, the hard, stubborn sandstone known as the Rodessa just doesn't yield effectively to fractures.

The so-called "speed" fracturing isn't very speedy in the country around Citronelle. While oil and sand can be pumped into West Texas wells at the rate of 60 bbl. or more per minute, the process is slowed to about 18 bbl. a minute here because of the tight formation.

At Citronelle gelled oil usually is used. In some cases it's pumped down the tubing, a system which cuts the injection rate to as low as 7 to 12 bbl. per minute.

There has been some talk of using water rather than oil, but so far it hasn't been tried. Some feel that because of the high clay content of the Rodessa sand any advantages of water would be offset by swelling of the already-tight formation.

3. The Future

Picture may brighten . . . What are the prospects of a reasonable payout at Citronelle?

You get different answers from different people. And there's good reason, for some operators are finding Citronelle much more profitable than others. There are wells here which have made their allowable almost without interruption. Others produce as little as 10 or 20 bbl. a day in some months.

An official of a prominent oil-well service company sums up Citronelle this way: "It's something of a problem field." Then he adds, hopefully, "There's a lot of oil there." The problem now, he concedes, is to find an economic way to produce it.

But already the field has set some notable records. Although average production per well has dropped from about 214 bbl. a day last August to about 144 bbl. a day at present, total output from the field has risen steadily.

Since its discovery Citronelle has produced more than 4,000,000 bbl. of high-gravity oil. More than 1,500,000 bbl. of that total has been in the past year.

The future of Citronelle may not look quite so promising as it did 2 years ago, but it looks much brighter than it did on August 15, 1955, the day before oil was first reported on a drill-stem test in the Donovan discovery.

Even brighter than the immediate future is the long-range prospect of finding more fields in similar formations extending through Mississippi,

Alabama, the eastern sector of the Gulf of Mexico, and Florida. Citronelle was but one step into a wide belt which might some day become an important oil province. Maybe the new fields, when they are discovered, won't be quite so stubborn as Citronelle.

4. Public Reaction

People disillusioned . . . A spokesman for one of the major operators here recently remarked: "We're still just as happy with Citronelle as we ever were." This brings up another question, perhaps more pertinent in the long run: What do the people of Citronelle think of the oil industry?

In general, they are disappointed. Of the nearly 2,500 persons living in the Citronelle area nearly 2,000 are said to hold a direct or family interest in productive acreage. With royalty interests split in many cases into fractional acres, disillusionment was inevitable.

Disillusionment at Citronelle is fed almost constantly by the flood of rumors. One lease broker explains emphatically that "most of this misundertsanding is a matter of public relations."

He complains that royalty owners are sometimes snubbed when they ask questions about the production outlook. "They're entitled to know what's happening," he argues. "It's their land."

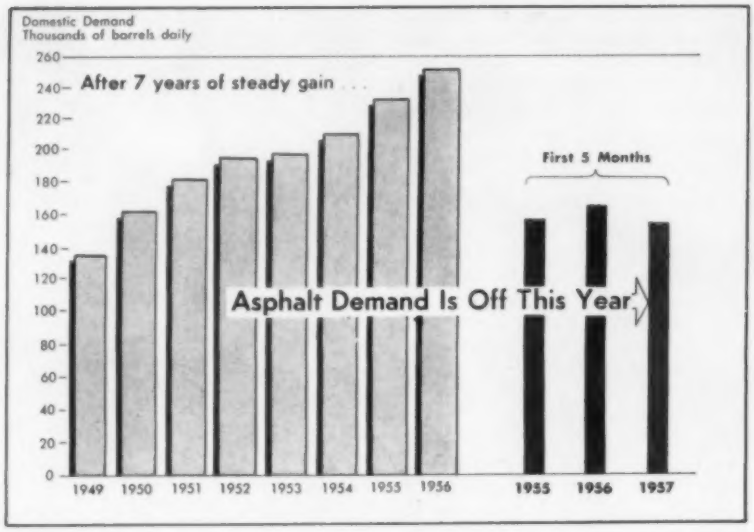
Because of misinformation and lack of information, Citronelle's opinion of the oil industry is based pretty much on rumors. And a great many put the industry in a bad light.

Greed often accompanies oil in a boom town, but there is surprisingly little of it evident in Citronelle today.

True, the town has levied a severance tax of 3 cents a barrel on crude produced within its corporate limits, plus 1 cent a barrel on production in the outlying area under its police jurisdiction.

True, too, the city-county school board turned down a $227,340 bonus and the customary 12½ per cent royalty for a 637-acre lease. Instead, the board took a much lower offer of $115,637 which provided a generous 19 per cent royalty. Incidentally, the board has learned the hard way that dry holes pay no royalty.

But, in most cases, the easy-going routine of Citronelle citizens has changed little since the discovery of oil here. They tell, for instance, of Mrs. Birdie Walker, whose royalty check is estimated at several thousand dollars a month. She still works as a cashier for the local utility company. But now she drives to work in a Cadillac.



Road program is late, so . . .

Don't Look for a '57 Record

ASPHALT is one petroleum product that couldn't miss this year. But apparently it is going to do just that.

Demand was expected to set an all-time high in 1957—just as it had been doing almost every year since the end of the war. With the nation's greatest highway building program getting started another record was considered certain.

Actually, demand for the first part of this year ran 4.7 per cent behind last year, according to the U. S. Bureau of Mines. And experts, even though they expect a comeback later in the year, believe that demand for all of 1957 will not surpass—and may even be less—than last year's.

Demand for the January-May period this year was 156,800 bbl. daily against 164,500 bbl. daily for the same period of last year. Because of the unexpected slowup in demand, stocks rose. They were 17 per cent above the year before.

The inventory increase of 2,206,000 bbl. is substantial, percentagewise. But it represents supply for only a week or less when the midsummer demand is on. It should not, therefore, have any serious effect on the market.

The highway program alone was expected to require 20 per cent more asphalt this year than last. The U. S. Department of Commerce forecast the 1957 demand for construction at 8.73 million tons, against 7.15 million tons in 1956. Since highway construction represents 71 per cent of all demand for asphalt, there apparently was sound optimism for 1957 needs.

Experts advance three reasons for failure of demand to materialize as expected:

. . . **Bad weather** has slowed down construction.

. . . **Tooling up** for the highway program has taken longer than expected.

. . . **The cement industry** strike has delayed construction of bridges and other structures essential in road building.

Federal appropriations have not delayed the highway program. During the fiscal year ended June 30, the administration had planned to set aside $2,225,000,000 for specific projects. At the end of that time, commitments added up to $2,223,000,000, about one-tenth of one per cent under expectations.

In order to give the states ample time to make plans, the federal highway administrator already has announced its allocation of $2,875,000,000 for the fiscal year 1958. This will be the biggest total so far. It was announced early to "insure uninterrupted progress" in the program which the Department of Commerce now estimates will take 16 years.

The department recognizes that, while the money has been appropriated, construction has not gone ahead as fast as expected. It lays the delay to lack of engineers, a short supply of steel in the early days of the program and a shortage of concrete.

Import Hearings Near

They'll be wide open, as will all negotiations under the control plan, Carson says. Hearings may start this week

WASHINGTON. — Administration officials are working at top speed to get the new import-control program rolling.

Navy Capt. M. V. Carson, Jr., administering the plan as a special assistant to Interior Secretary Fred A. Seaton, is writing the ground rules and setting up the machinery.

Public hearings on importers' objections to the new controls will start soon, possibly by the end of this week or at most within 10 days.

Forms for the monthly reports which importers will be asked to file are being prepared. Each report will show the actual imports for the month and the planned imports over the following 5 months.

Everything the import administration does will be in the open, Carson assured The Oil and Gas Journal. Importers, domestic oil interests, and the consuming public will be able to follow every step of the effort to keep imports within the limits set by the cabinet committee.

"Seven or eight" companies already have asked to be heard on their allocations. The problem of each company will be taken up separately, Carson said. Most of the companies asked for hearings when they answered Carson's request for cooperation.

To meet with Sun . . . The most immediate problem faced by Carson is that raised by Sun Oil Co. Robert G. Dunlop, Sun president, wired Carson that he recognized that imports were excessive and said Sun plans to cut its own imports back over the next 8 months.

But Sun cannot agree to join with others in a voluntary program to restrict or allocate imports because of a belief that this might constitute a step toward a cartel arrangement violative of the antitrust laws, Dunlop said.

Carson disclosed that he has wired Dunlop, asking for a meeting to discuss the company's position. Atty. Gen. Herbert Brownell, Jr., has made no announcement of his views on the program. But government officials show no concern about Justice Department support.

Sun is the only importer to raise the antitrust question so far. Other companies based their objections to the program on its effect on their operations.

Compliance expected . . . Carson, himself, believes that he will have little trouble in getting full compliance from the importers.

"The cabinet committee had the very best information available," he said. "If they reached a conclusion that imports posed a threat to national security, I am optimistic that the companies involved will take that fact into their reckoning."

Refusal to comply could lead to formal imposition of these same allocations by the President under the national-security clause of the Reciprocal Trade Act. Or it could lead to the matter getting into the hands of Congress, which might enact a much stiffer quota law.

The new monthly report forms will be sent out to importers as soon as possible. Carson doesn't expect a big immediate drop in imports. The program is setting up daily averages for a year, he pointed out. Reports over the first few months will be useful in showing trends, but it will take some time for the companies to revamp their programs and commitments, he said.

Plant Pulls Switch

Kermac turns crude stills to production of solvents

OKLAHOMA CITY. — Kerr-McGee Oil Industries, Inc., is upgrading octanes and going into the solvents business at its Cleveland, Okla., refinery. But plans for a Udex unit have been "tabled for future consideration."

Long-idle crude fractionators at the plant are being reactivated, with improvements, to cut up straightrun gasoline into reformer feed stock and material for making the solvents. To boost octanes, the 1,800-bbl. U.O.P. Platformer is getting a fourth reactor and additional compression.

The Unisol treater is also being worked over. It removes sulfur and other impurities from the feed stock. Litwin Engineering Co. of Wichita, Kans., is doing the work.

The Cleveland plant gets its straightrun gasoline from Kermac's 21,500-bbl. refinery at Cushing. A 30-mile pipeline, which does double duty, connects the two.

The line gathers crude for the Cushing plant and reverses its flow to send feed stock to the Cleveland plant. It also moves some high-octane gasoline components to Cleveland for blending with the platformate.

The Cleveland plant was shut down when Kermac took it over about 1½ years ago from Johnson Oil Refining Co. Since then, Kermac has operated only the Platformer.

Platform Scheduled

Socal, Humble get permit to test Summerland lease

SANTA BARBARA. — Permission has been granted for construction of an offshore drilling platform to test the $7,250,606 Summerland offshore lease held jointly by Standard Oil Co. of California and Humble Oil & Refining Co.

Authorization came just as an adjacent lease held by Tidewater Oil Co. yielded a dry hole on its first test. Both tracts are in Santa Barbara County on state-leased lands.

The Socal-Humble platform would be about 2.2 miles offshore, pylon-supported, and rising 40 ft. above the ocean's surface. Location is 6 miles south of the city of Santa Barbara.

The two companies asked permission to construct the platform after drilling two core-hole tests on the 5,500-acre parcel. The authorization is the first for an offshore platform under the 1955 Shell-Cunningham Act opening southern California tide and submerged lands to wildcat operations. It is subject to approval by the U. S. Army Corps of Engineers, the state director of natural resources, and the state attorney general.

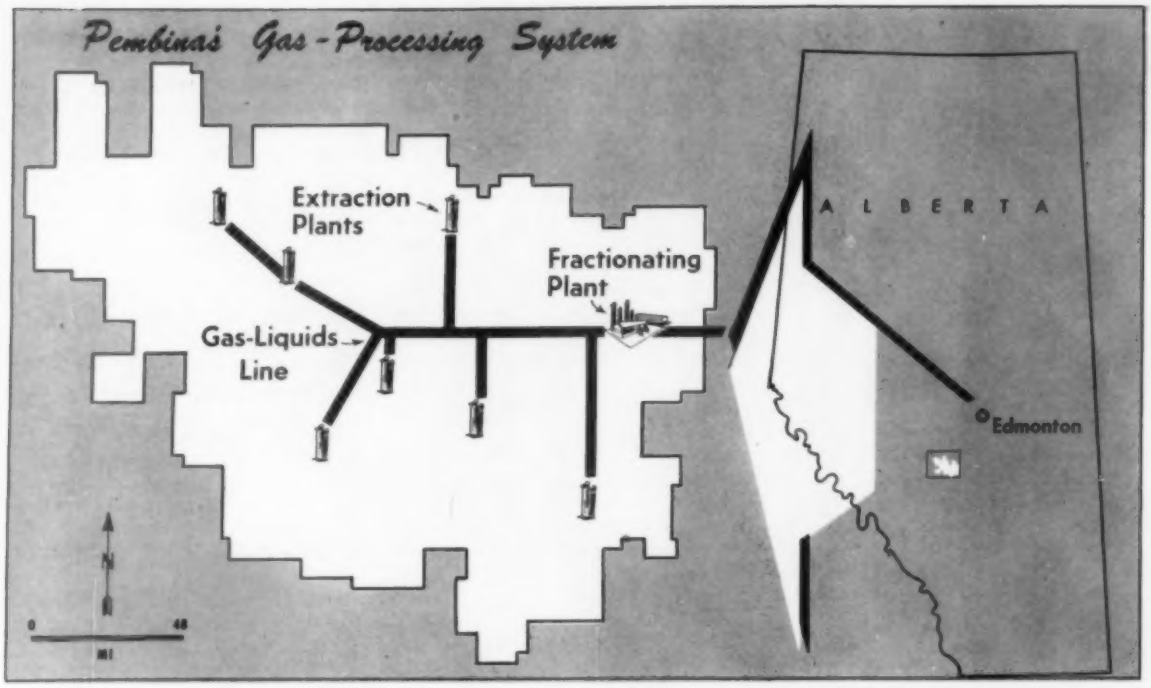
Tidewater's dry hole, 1 Seaside State, went to a total depth of 6,191 ft. The company says it has no immediate plans to spud a second test.

West Texas Flood on Tap

AUSTIN.—White Eagle Oil Co. will soon launch a water flood in the Queen sand under 950 acres in White and Baker fields of Pecos County in West Texas. It expects to recover an added 2,100,000 bbl. of oil.

First well on the lease was completed in June 1938. There now are 35 producing wells in the project area making an average of about 7 bbl. per day per well.

The company plans now to inject fresh water from the Trinity sand at 400 ft., using two 20-acre, five-spot input patterns to start. Water will be injected at rates of 150 to 200 bbl. daily per well.



Pembina Project Reaches Bid Stage

EDMONTON.—Bids are being received on the proposed 95,000 M.c.f. gas-processing system in Pembina, Canada's biggest oil field.

As a starter, contractors were asked to bid on seven compressor-refrigeration separation plants which will be scattered throughout the giant field.

The next bids will probably be for the proposed 240,000-gal. central fractionating plant, and two more separation plants. Final arrangements for the two additional separation plants have not been made yet.

These units will all be a part of a $17-million project to end gas flaring in Pembina field and boost pressure maintenance. The Alberta Oil and Gas Conservation Board approved the project following a hearing in July (OGJ, Aug. 5, p. 59).

Goliad, Ltd., Canadian subsidiary of Harry Bass & Sons, Inc., Dallas, will operate the fractionating plant and a liquid gathering system. Operators in the field will be responsible for lease gathering systems and the separation plants, although Goliad will probably make arrangements to operate all or some of the plants.

Original plans called for building a gas-gathering system to bring residue gas to a central sales point. But this has been modified, and here's the way it looks now:

... Pembina will be divided into nine areas, with a separation plant for each area. Some of the acreage in the field has been exempted from the plan, but operators holding 85 per cent of the pool have agreed to take part in the project.

... Gas will be compressed, dehydrated, and passed through refrigeration units operating at minus 10-15° F. About 95,000 M.c.f. will be processed daily. After liquids are removed and some gas burned as fuel, 67,500 M.c.f. will be available either for pressure maintenance or sale.

... A 47-mile gathering system of 3, 4, and 6-in. lines will carry the liquid hydrocarbons to a central fractionating plant.

... The fractionating plant will probably be located near the town of Drayton Valley within the field. It will process slightly more than 240,000 gal. of liquid products daily (equal to about 200,000 imperial gallons). This will include 120,000 gal. of propane, 76,200 gal. of butanes, and 52,560 gal. of pentanes plus.

Present plans call for a 6-in. products line from the plant to a railroad near Breton, just east of Pembina, but this may be altered. Polymer Corp., Ltd., is planning to build a butadiene plant at Red Deer, 75 miles southeast of the field.

Butane needs of the Red Deer plant could make it more practical to build a products line toward Red Deer and use facilities there for transshipment to other points.

Another plan calls for the use of L.P.G. in secondary recovery at Pembina. If this pilot project develops, it would provide another outlet for products and would firm up the field location for the fractionating plant as now planned.

Prospective buyers of the dry gas include Pacific Gas & Electric Co., which will build a gas line to California, and Trans-Canada Pipe Lines, Ltd., which is building a line to eastern Canada.

The Pembina Operators' Committee is negotiating with P.G&E. on the possibility of selling the gas to Northwest Utilities, Ltd., until P.G.&E.'s 1,300-mile line to San Francisco is completed in 1960. Trans-Canada has offered to buy 25,000 M.c.f. of gas daily.

Target date for completion of the Pembina gas system is November 1, 1958. This is the gas-flaring deadline set by the Alberta conservation board earlier this year. When Bass' proposal was submitted to the board, about 30 companies operating at Pembina were listed in the application.

Pembina field is one of the largest on the continent, covering about 400,000 acres and producing about

120,000 bbl. daily. Some operators are already water-flooding parts of the field to help boost ultimate recovery.

Carbonated Water Flood Is Launched On Oklahoma Lease

BARTLESVILLE, Okla.—The nation's first full scale carbonated water flood, using the Orco Process, is being developed on a 240-acre stripper lease northeast of here in Washington County.

Wellsville Oil Co. of Wellsville, N. Y., and Oil Recovery Corp., New York City, will use carbonated water instead of ordinary water or brine to increase ultimate recovery from the lease.

The Orco Process is owned by Oil Recovery Corp., and has been developed in pilot areas over a number of years. However, this is the first commercial application of the process.

Wellsville will operate the project, which will be carried out on a five-spot pattern. Producing formation is the Bartlesville sand, found at about 1,300 ft.

The water supply will be obtained from the Arbuckle lime found at 2,500 ft. The carbon dioxide required for carbonating the water will be generated at a plant on the lease.

Wellsville and Oil Recovery Corp. acquired the lease from John M. Kane and Russell Straight et al., Bartlesville.

Military Cuts Oil Purchases

WASHINGTON.—Military oil-product purchases over the next 10 months will be cut by at least $115 million and perhaps by as much as $170 million.

Rear Adm. O. P. Lattu, executive director of the Military Petroleum Supply Agency, said the cut was necessary to conform to Defense Secretary Wilson's order to reduce military spending by 10 to 15 per cent.

The MPSA had counted on having $1.143 billion to spend for oil in the current fiscal year which ends June 30. But less oil than expected will be needed because of the mothballing of 60 naval vessels, a cut of 100,000 in military manpower, and other reductions in force.

"The over-all result of the order may mean not only reduced procurement requirements by the military services, but also a reduction in lifting against contracts currently in effect," Lattu said.

First heavy-duty butyl tire promises:

Escape From Natural Rubber

WASHINGTON.—Army Ordnance has its first heavy-duty truck tire made of 100 per cent synthetic butyl rubber.

The military sees these advantages in the development:

... **Independence** from imported natural rubber.

... **The new tire** will not deteriorate in storage.

... **Ingredients of butyl** rubber are plentiful.

The tire was developed jointly by Esso Research & Engineering Co. and Pennsylvania Tire Co. In rigorous field tests, Ordnance found the butyl tires to be at least the equivalent of or superior to present military tires made from GR-S and natural rubber or natural rubber alone.

Butyl rubber is made from isobutylene, a refinery gas, and isoprene. Isoprene is methyl butadiene and the molecular unit of natural rubber. Both raw materials are mass produced.

Molecules of butyl rubber are closely knit. This chemical quality of "saturation" prevents the synthetic from chipping and cracking, particularly in the treated area. It also makes the tires immune to ozone cracking and deterioration, which has been a big headache in military stockpiling of tires.

Passing Army's "acid test" is a major milestone in Esso's aim of getting more of its butyl rubber into tires.

Butyl is now made by Esso Standard Oil Co. in Baton Rouge, La., and Esso's affiliate, Humble Oil & Refining Co., in Baytown, Tex. Canada's government owned Polymer Corp. is turning out butyl at Sarnia, Ont., and several U. S. and foreign manufacturers are licensed to make it.

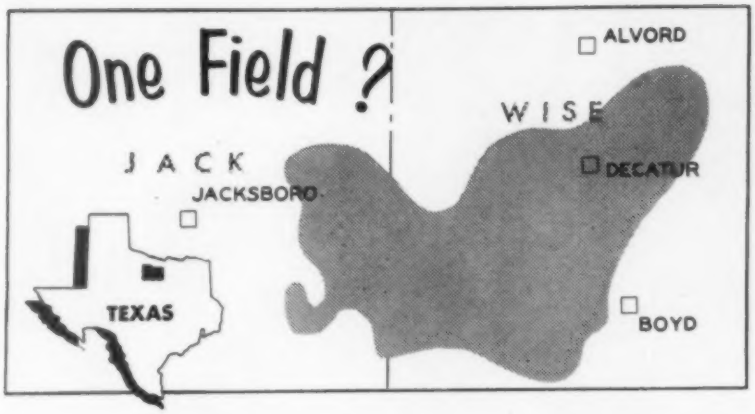
Firms Fight for Pipeline

CALGARY.—Pipeline competition is getting tougher in Canada.

For the first time in the country's history a company has made application to build a crude line after another has already been granted permission to do so.

The firms want to tap the Willesden Green producing area of Alberta. They are Pembina Pipe Line, Ltd., which has the construction permit, and Gibson Petroleum Co.

Pembina was ready to start work last week on 22 miles of 6-in. line to connect Willesden field with the company's Pembina field system. The line would have a capacity of 10,000 bbl. daily. Initial throughput is expected to be about 2,000 bbl. a day.



Field Fight Nears End

Briefs are filed with commission in long hassle over consolidation of Jack, Wise fields. Next step: Decision

DALLAS.—Final briefs have been filed in a hot legal battle over consolidating into one giant field the Bend gas-producing area in Jack and Wise counties, North Texas.

The Texas Railroad Commission will decide whether to merge 81 fields containing 362 gas wells and scattered over 550,000 acres. The resulting field, if formed, would stretch 35 to 40 miles long and 20 to 25 miles wide.

The commission has conducted bitterly fought hearings, and briefing was completed last week.

Favoring the consolidation are Lone Star Gas Co., its affiliate, Lone Star Producing Co., and Brazos River Gas Co. Opposing it are the Christie, Mitchell & Mitchell group of Houston and Warren Petroleum Corp.

Lone Star, which filed the original application, argues that the present 81 fields produce from the same reservoir but are regulated differently. It points to where fields overlap and cases where wells in one field are separated from each other by wells in another field.

Lone Star says that differences in field rules, governing such things as spacing and allocation formulas, are causing nonratable take, inequities, and general confusion. As development proceeds, conditions will become ridiculous and chaotic.

Christie, Mitchell & Mitchell and Warren contend there is no evidence that the Bend pay throughout the big area is interconnected. Development is too sparse to warrant wholesale field consolidation.

Where they agree . . . Both sides agree the area is one huge strat trap. They also agree that consolidation is necessary. But they disagree on how much.

One reason for disagreement lies in the nature of the Bend conglomerate pay in the area. The pay dips northnortheast from the Bend Arch covering all of Jack and Wise counties and a small area in northern Parker County. Geologically it is in the Fort Worth Basin.

The zone is a group of conglomerate sandstone stringers and lenses—some extensive, others much smaller. Some wells penetrate only one or two zones, while others produce from as many as 13 zones—from the top of the Caddo conglomerate to the top of the Marble Falls.

The area has produced gas since the 1940's, but the heaviest drilling has occurred in recent years with the advent of fracturing. Lone Star estimates development at only 20 per cent.

Production last year averaged 78,000,000 cu. ft. per day, and Lone Star estimates this will increase to 325,000,000 in the next few years. It estimates reserves at 2¾ trillion cubic feet.

The C. M. & M. group has a reported 250,000 acres in the area and Lone Star 40,000 acres.

Pro and con . . . Lone Star says nine fields which operate under special field rules get an allowable break over the other 72, which are subject to regular state-wide rules.

The special fields, which can produce up to 100 per cent of potentials, are draining the others, which can produce only 25 per cent.

The opposition challenges Lone Star's contention that the fields are all interconnected and suggests that the commission consolidate some fields but retain as separate fields all those in eastern Jack County and the Boonsville field.

The pipeline issue . . . C. M. & M. strikes at Lone Star's motives in the case. The reason for the application, says C. M. & M., is that Lone Star wants "to continue its monopoly over the gas supplies of the area by preventing producers from obtaining sufficient gas allowables so they can survive and continue to develop their leases."

The brief of C. M. & M. argues that Lone Star, the sole major buyer of gas in the area previously, has held down its gas takes in the past and caused injury to producers in unjustifiably long payouts. This, says the brief, occurs because Lone Star contracts for more gas than it can market.

C. M. & M. and other producers report they will get their first gas outlet next February when Natural Gas Pipe Line Co. of America lays a line into the field. But if the field is combined, much of the allowable of these producers will be chopped off and given to wells of Lone Star, which fought Natural Gas Pipe's entry into the area.

Since Lone Star already is in a surplus-gas position, the brief claims, the consolidation would depress area production and give Lone Star "the power of financial life or death over the Christie-Mitchell group."

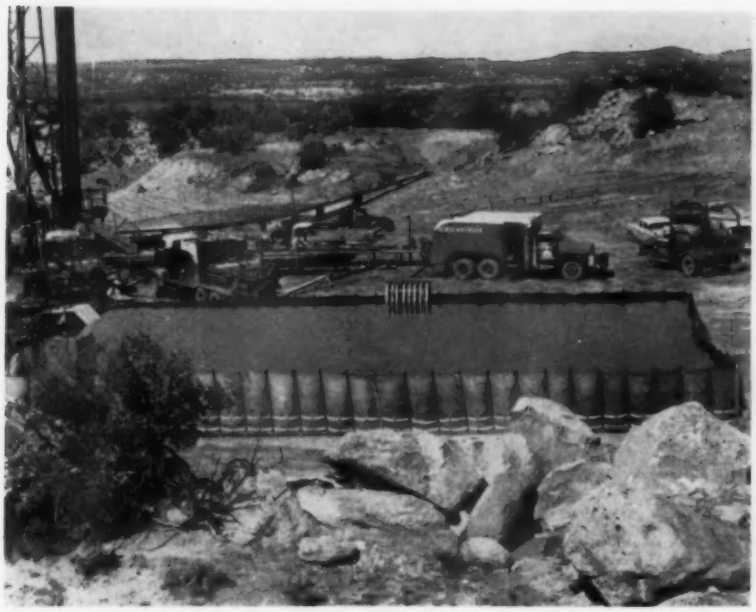
The group also accuses Lone Star of seeking consolidation to kill Natural Gas Pipe's pipeline project. If the pipeline is built, says C. M. & M., Lone Star will have to hike its per-well take to the level of Natural or suffer "a producer and royalty-owner rebellion."

Pipeline Hearing Recessed

WASHINGTON.—Federal Power Commission hearings on Midwestern Gas Transmission Co.'s application for a pipeline system through the Middle West which will draw on both Canadian and southwestern gas supplies are in recess until the end of this month.

The hearings were suspended July 26 in line with the FPC's policy of making August a "vacation" period. They will resume August 26.

Commission officials refused to speculate on how much longer the hearings will run. They could be wound up in a short time if no rebuttal testimony is offered after cross-examination, they said. Or they could be strung out for weeks.



Substitute Tank Does Double Duty

EXTRA MILEAGE is being squeezed out of this rubberized-nylon tank by Halliburton Oil Well Cementing crews.

The tank's number one job is to help ease the shortage of steel water tanks in the San Juan basin. But Halliburton's fracturing and rig crews have found it's also a dandy swimming pool. And they have made the most of that fact on the eight jobs where the tank has been used thus far.

The big tank is 76 ft. long, 45 ft. wide, 6 ft. deep, and holds 120,000 gal. Despite its size, however, it is handy for hauling—it folds into a bundle weighing only 800 lb. It and the hardware that goes along with it—another 2,000 lb.—fit neatly onto a 24-ft. trailer.

B. A. drills deep in Oklahoma:

Knox Well May Hit New Pay

BRITISH-AMERICAN Oil Producing Co. may soon add production from deeper Oil Creek to the prolific gas and condensate output of its Bromide sand wells in Knox pool of Grady County, Oklahoma.

The well which likely will do the job is B. A.'s 1 Kriger, 2½ miles southeast of the field discovery, the 2 Harrison. It is the second field confirmation test.

The 1 Kriger flowed gas and condensate heavily from both the Second and Third Bromide sands in drill-stem tests. The well then probed ahead to find a 90-ft. section of Oil Creek sand which B.A. says resembles the Bromide closely.

The company tested the Second Bromide from 14,807-14,918 ft. and Third Bromide from 15,012 to 15,215 ft. It drilled through Oil Creek sand from 16,535-16,625 ft.

The company took no cores and ran no drill-stem tests in the Oil Creek. Instead it cased off both Bromide and Oil Creek with 7-in. to 16,624 ft. and resumed drilling to find the Arbuckle.

But a company spokesman said both samples and electric logs of the Oil Creek looked favorable. Odor of the samples also was good.

Higher on structure . . . The Bromide, which one official called the best-looking structure so far, was topped roughly 200 ft. higher in the 1 Kriger than in the previous two wells.

In the test of the Second Bromide, the well flowed gas gaged at a rate of 6,600,000 cu. ft. daily plus 22.5 bbl. of 54.6°-gravity condensate per hour through ¼-in. bottom and ⅜-in. top-hole chokes. Tool was open 180 minutes and shut in 30 minutes. Water cushion reached the surface in 23 minutes and gas and mud in 47 minutes. Flowing tubing pressure built up from 7,000 to 7,305 psi. at the end of the test. Bottom-hole shut-in pressure was 9,400 psi.

The Third Bromide from 15,123-15,297 ft. flowed gas at the rate of 5,700,000 cu. ft. daily plus 143.5 bbl. of condensate per M.c.f. The tool was open 155 minutes and shut in 20 minutes. The test was made using ¼-in. bottom and 19/64-in. top-hole chokes and a 5,020-ft. water cushion.

Water reached the surface in 20 minutes and gas in 41 minutes. The surface choke then was switched to ¼-in.

Flowing tubing pressure built up from 8,320 psi. to 8,750 psi. at the end of the test. And shut-in bottom-hole pressure was clocked at 9,435 psi.

Near depth mark . . . If B.A. should establish commercial production in the Oil Creek in the 1 Kriger, it would lack only 10 ft. of being Oklahoma's deepest producer.

The current record holder, B.A.'s 1 Reed in the same field, was completed at 15,575-15,635 ft. in the Bromide earlier this year (OGJ, Mar. 11, 1957, p. 111).

Shale Lands Sought

U.S. sues to recover title to 2,000 acres in Colorado

DENVER.—The U. S. Government is attempting to gain title to more than 2,000 acres of western Colorado oil-shale land in a law suit filed in U. S. District Court here against Rex L. Eaton of San Marino, Calif.

The Garfield County land is valued at nearly $1 million.

In addition to Eaton, defendants are Eaton Shale Co. of Denver, described as a wholly owned subsidiary of Standard Oil Co. of California, and six members of Eaton's family.

U. S. Atty. Donald E. Kelley said original claims to the disputed land were filed in 1918 by P. C. Thurman, who had listed persons on the claims without their knowledge. Thurman later conveyed the claims to Eaton, the suit alleges. The claims were voided in 1939 when it was discovered that the original filings had been made illegally.

The U. S. Government "mistakenly" allowed Eaton to patent the claims in 1951. Two years later the Eaton family sold the claims to Eaton Shale Co. for $957,804. Kelley demanded in the suit that either the land be returned to the federal Government or the Eaton family pay the $957,804 to the Government.

EL PASO NATURAL GAS PRODUCTS COMPANY
CINIZA REFINERY
CREATING FINER MOTOR FUELS FOR A GREAT NEW NAME IN GASOLINE
EL PASO
ENGINEERING AND CONSTRUCTION BY
SWECO
SOUTHWESTERN ENGINEERING COMPANY
LOS ANGELES, CALIFORNIA

Sign of progress tells story of . . .

. . . Bustling newcomer to refining.

El Paso Plant Nearing Completion

GALLUP, N. M.—The newest, most modern, and second largest refinery in New Mexico is going together fast.

This is El Paso Natural Gas Products Co.'s plant at Ciniza, 10 miles due east of Gallup.

Construction of all units is proceeding on schedule. And the new refinery, the first of several El Paso plants to be built from the ground up, is slated to go on stream the last of October.

The refinery will have a charge capacity of 6,500 bbl. daily and will process crude from the new and growing Four Corners oil area.

Facilities at the plant will keep it in a good competitive position in the refining octane chase for some time. They include: a 6,500-bbl. crude-distillation unit, a 2,000-bbl. vacuum unit, a 1,600-bbl. fluid catalytic cracker, a 3,000-bbl. Platformer, and a 750-bbl. hydrofluoric acid alkylation unit.

Cost of the plant is estimated at $10,000,000. Process engineering has been handled by Universal Oil Products Co., the engineering and construction by Southwestern Engineering Co. of Los Angeles.

Plant site is on ground adjacent to El Paso Natural Gas Co.'s big Wingate fractionation plant. The refinery will take butane and natural gasoline as raw materials through short lines to the fractionation plant.

Crude will reach the refinery through a 96-mile, 6-in. products line purchased from the parent firm and connected to the Blanco gasoline plant near Farmington. El Paso Natural Gas Products will convert the line to crude service. The company is building an extensive crude-oil gathering system to tie into this line.

Products at the refinery, in addition to regular and premium gasoline, will include kerosine, diesel fuel, distillates, and fuel oil.

C. L. Moore, company vice president and general manager, says capacity can be expanded readily to meet future requirements in the region. Crude production, he thinks, will increase greatly in the Four Corners region within the next few years.

Fast drive to integration . . . Completion of the Ciniza refinery will boost El Paso's refining capacity to 16,000 bbl. daily. The company started from scratch when its drive to become an integrated firm was kicked off in October 1955 with the purchase of the McNutt Oil & Refining Co.

Capacity will rise further next year to 22,500 bbl. daily with completion of another new 6,500-bbl. refinery at Odessa, Tex.

Besides the Ciniza and Odessa plants, El Paso owns and operates a 4,500-bbl. refinery at Brickland, a 4,000-bbl. plant at Prewitt, and a 1,000-bbl. topping plant at Bloomfield, all in New Mexico.

The company plans to handle the bulk of its refinery output through its own retail outlets. It acquired 125 stations in the McNutt purchase in West Texas, New Mexico, and Arizona. It is opening others now in the San Juan basin area and building more in other areas of the three states.

One of the company's biggest incentives toward becoming a refiner was the huge daily supply of L.P.G. products it acquires through its gas-processing activities. This supply had swelled to roughly 25,000 bbl. daily and had become somewhat of a white elephant.

Little Inch Review Denied

WASHINGTON. — The Federal Power Commission has closed the door on further review of Texas Eastern Transmission Corp.'s plans to switch the "Little Big Inch" pipeline from gas to products service.

The FPC denied an application of Mississippi River barge operators for reopening of the record and further hearings.

But Harold Leventhal, counsel for the barge interests, said the FPC's action will be appealed to the District of Columbia Federal Court of Appeals.

The case was before this court last month but was thrown out on the ground the complainants had not exhausted their administrative remedies.

The FPC ruling was the last step in that direction, Leventhal said, and the court now will be asked to rule whether the commission had erred in omitting the examiner's report usually made in such cases.

The bypassing of this decision was "both legally proper and urgently required" in this case, the FPC said.

Island Test Set

Canadians going offshore from coast of Washington

VANCOUVER. — The search for oil and gas in British Columbia is moving into the untested Gulf Island group below the city of Vancouver.

A three-company Canadian combine is due to start a core hole this week on Saturna Island in the Bellingham Basin about midway between Vancouver Island and Bellingham, Wash.

The companies are Canadian Collieries, Ltd.; Pacific Petroleums, Ltd.; and Charter Oil, Ltd. Each has one-third interest in about 100,000 acres in the islands, according to Norman R. Whittall, president of Canadian Collieries.

Whittall, whose company is just branching out from coal and timber, said the test is projected to about 6,000 ft. Charter Oil is the operator. Boyles Brothers of Vancouver is the drilling contractor.

Whittall said geological studies have been made in the Gulf Islands, but there has been no previous drilling there. The nearest British Columbia island to get a test, he said, was in the Queen Charlotte group more than 400 miles to the north.

A number of wells have been drilled on the mainland of southwestern British Columbia in the area around Vancouver, but none has been commercial.

Processing briefs

Canadian Oil Companies, Ltd., may expand its Sarnia, Ont., refinery by adding another 20,000 bbl. to its crude capacity. Capacity of the plant was recently boosted 50 per cent to 30,000 bbl. daily. New aromatics recovery facilities were completed 2 months ahead of schedule, and benzene, toluene, and xylene production is now in full swing.

Eastern States Petroleum Co., Inc., Houston, has changed its name to Eastern States Petroleum & Chemical Corp., to more accurately describe the company's over-all operations. The firm manufactures more than 40 specialized chemical products. R. B. Kahle, president, said plans call for production in the near future of xylene isomers, ethylbenzene, cyclohexane, and other related chemicals.

Ashland Oil & Refining Co. is boosting asphalt capacity at its Canton, Ohio, refinery by addition of a new heater, a vacuum distillation tower, and oxidizing equipment. The vacuum facilities will be on stream by November 15, and the oxidizing unit will start up in March.

A new Udex unit to produce benzene, toluene, xylenes, and heavy aromatics for chemical use will be put on stream at the company's Buffalo refinery shortly after January 1. Ashland recently completed new catalytic reforming capacity at Buffalo and Canton.

Stauffer Chemical Co. will build its eighth major sulfuric acid regeneration plant, a 400-ton daily operation at Hammond, Ind. To cost more than $4 million, the plant will help supply the Hammond, Whiting, and Chicago areas with process acids. Similar Stauffer plants are at Houston, Baton Rouge, Baytown, Tex., and Dominguez, Calif.

Sunland Refining Corp. has put a 1,000-bbl. Platformer on stream at its 8,000-bbl. refinery at Bakersfield, Calif. Litwin Engineering Co., Wichita, Kans., was contractor on the $500,000 project.

Wilshire Oil Co. of California has wound up a $500,000 construction program to triple gas-scrubbing capacity and double sulfur recovery.

Southwestern Engineering Co. installed a new gas-scrubbing plant rated at 15,000,000 cu. ft. daily. The new sulfur-recovery unit, which increases capacity to more than 20 tons a day, was built by Ralph M. Parsons Co.

Two sulfuric acid plants, each with a capacity of 200 tons a day, will be built in Casper, Wyo. Davison Chemical Co., a division of W. R. Grace & Co., has let contract for a $2-million plant to Leonard Construction Co. of Chicago. Platte Chemical Co. of Salt Lake City will build the other plant, but has released no further details.

The plants will use molten sulfur from northwest Wyoming as raw materials. They will also convert spent alkylation acid and hydrogen sulfide from Wyoming refineries to sulfur dioxide.

Esso Standard Oil Co., largest refiner in the U. S. with 650,000-bbl. capacity, reduced runs to an average of 530,000 bbl. per day during the first half of 1957. July runs were 509,000 bbl. daily compared with 559,000 bbl. daily in July 1956.

A special lubricant for free-piston engines has been developed by Shell Oil Co. It is the first on the market designed for that specific purpose. The lubricant, which took 6 years to develop, has been tested extensively in free-piston engines for utilities, locomotives, and ships.

Also for Refiners . . .

Asphalt production was expected to hit an all-time high in 1957, but figures for the first half of the year show demand is down 4.7 per cent. Some experts think this trend will continue throughout 1957 (p. 96) . . . Importers protesting the new imports plan are expected to appear before government officials within a week or 10 days (p. 97) . . . Kermac is expanding its Cleveland, Okla., refinery (p. 97) . . . Bids are being received for a big processing system in Alberta's Pembina field (p. 98) . . . Army Ordnance is high in its praise of butyl rubber tires (p. 99) . . . El Paso is nearing completion of its 6,500-bbl. refinery near Gallup, N. M. (p. 102) . . . Russia plans to develop oil-bearing sands in the Baku area (p. 120).

PLUS THESE TECHNICAL FEATURES: Canadian refining has growing pains (p. 135) . . . and special report on Canadian refinery construction (p. 239).

Savanna Gas Contracts Signed

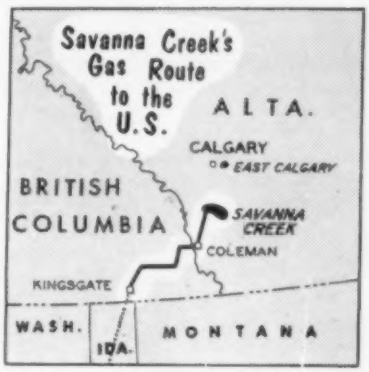
Alberta Gas Trunk Line will build portion of pipeline to U.S. border; $15-million sulfur plant is announced

CALGARY. — Three developments last week will help speed the movement of Savanna Creek's gas to California markets.

The last supply contracts covering all producers in the field were signed with Westcoast Transmission Co., Ltd., calling for the highest wellhead prices yet announced in western Canada. Contracts also were signed for East Calgary field gas.

In the second development, Alberta Gas Trunk Line Co., Ltd., announced it will build part of the proposed Westcoast line from Savanna Creek to the U. S.-British Columbia border, where it will join the line of Pacific Northwest Pipeline Corp.

Development No. 3 was the announcement that a $15 million sulfur plant will be built at Coleman, Alta., to sweeten Savanna Creek gas.



Supply contracts . . . The last contracts to be signed in Savanna were with two minority interest holders. They were Anaconda Petroleums, Ltd., which holds 5 per cent, and Savanna Creek Gas & Oil, Ltd., which holds 2½ per cent.

Contracts had been signed earlier with Canadian Husky Oil & Gas, Ltd., and Phillips Petroleum Co., each holding 32½ per cent, and Northern Natural Gas Producing Co., 27½ per cent (OGJ News Letter, July 29).

Westcoast will take 100,000,000 cu. ft. daily from Savanna Creek initially and 185,000,000 cu. ft. ultimately. Producers will receive 12 cents per M.c.f. at the wellhead the first 3 years, 12⅓ cents in the fifth, and escalations of ⅓ cent a year during the rest of the contract.

Contracts for a major portion of East Calgary reserves, located 2 miles east of Calgary, were negotiated with Jefferson Lake Sulphur Co. and Merrill Petroleums, Ltd. Prices in this field for clean dry gas would be 14 cents per M.c.f. the first year, 14½ cents the second, 15 cents the third, and an escalation of ¼ cent each year for the rest of the contract.

Westcoast will take 50,000,000 cu. ft. daily from East Calgary. Volume may be increased to a peak of 125,000,000 cu. ft. daily under contract options. This supply will presumably be connected to the previously announced line from Savanna Creek.

Westcoast is preparing applications for export to lay before the Alberta Oil and Gas Conservation Board and the Canadian Board of Transport Commissioners.

Sulfur plants . . . Westcoast plans to take the sour Savanna Creek gas by pipeline 40 miles to Coleman, where it will build the big sulfur plant, near the British Columbia-Alberta border.

Jefferson Lake has also said it would build a sulfur plant in the East Calgary area if sulfur content of the gas is high enough. Jefferson Lake is developing 80,000 acres east of Calgary. This region has excellent potential of sulfur-yielding gas.

Pipeline plans . . . Alberta Gas Trunk Line, a provincial company, which gathers gas for Trans-Canada Pipe Lines, Ltd., announced it would build a 15-mile section of line from the proposed Coleman sulfur plant to the Alberta-British Columbia border. From this point Westcoast would take the 30-in. line 100 miles to Kingsgate, B. C., to join with Pacific Northwest.

The contract signed by the Alberta company is the first that did not involve Trans-Canada, which will move gas east. The provincial government formed the company to help market Alberta gas.

Pacific Northwest plans to build a line from the Canadian border to its system at Spokane, giving it a second source of Canadian gas. Next month the company will start receiving gas from the newly completed Westcoast main line from Peace River to Washington.

Westcoast has announced plans to complete the 174-mile, 30-in. line from Savanna Creek to the Idaho border in 1958. Speedy government approval will be necessary for this schedule to be followed. Pacific Northwest has not yet received the go-ahead from the Federal Power Commission for its part of the project.

The newly contracted gas could supply a 500-mile, 34-in. line which El Paso Natural Gas Co. plans to build from the Pacific Northwest system at Twin Falls, Idaho, through Nevada to the California border (OJG, Aug. 5, p. 52). El Paso would deliver 100,000,000 cu. ft. daily starting September 1959, and 200,000,000 cu. ft. daily starting a year later to Southern California Gas Co. and Southern Counties Gas Co. These companies would move the gas to Los Angeles area markets.

New Pay Found

Bethel salt dome gives up deep condensate output

THE TEXAS CO. last week added gas-condensate production to regular oil production at the Bethel salt dome in Anderson County, Texas.

Bethel is one of two East Texas salt domes which were found productive last year. The other is Hainesville, in Wood County.

The new deep pay at Bethel, of Lower Cretaceous age, was found by The Texas Co. 1 E. C. Walton, located in Juan N. Acosta Survey. The well was drilled on the northwestern flank of the dome near the site of the 1956 discovery and in the same field.

Calculated potential from Rodessa perforations at 8,260-83 ft. was 20,500 M.c.f. of gas and an estimated 21 bbl. of 53°-gravity condensate per 1,000 M.c.f. Shut-in pressure was 3,425 psi.

Texaco opened Bethel to production last year following a series of tests. The best well made 140 bbl. per day from the Woodbine at 5,758 ft.

At about the same time, British-American Oil Producing Co. opened Travis Peak oil production on the southwest flank of the spine of Hainesville dome. Potential was 259 bbl. at 9,215 ft.

Until 1956 only Concord and Boggy Creek, both in Anderson County, produced commercial oil among East Texas' 18 salt domes. Concord now is abandoned. But all of the domes are suspected of having flank structures favorable for oil accumulation.

Salt dome discoveries always set off a new wave of leasing. If the new gas distillate discovery at Bethel dome holds up, it should be just as good a stimulant to operators as the original Bethel opener.

Final weld starts Canadian gas south as . . .

Westcoast Completes Gas Line

VANCOUVER.—Westcoast Transmission Co., Ltd., has completed the first major pipeline to export gas from the prolific fields of western Canada to the United States.

The final weld has been made and testing has been completed on the 650-mile, 30-in. line from the Peace River fields of northwestern Alberta and northeastern British Columbia to the U. S. border near Sumas, Wash. A 154-mile gathering system of 8 to 26-in. pipe is being laid.

Gas is flowing into opposite ends of the main line. Alberta gas is being pumped into the northern end and New Mexico gas is moving through the Pacific Northwest Pipeline Corp. system into the southern end, near Sumas, Wash. The two streams will meet at compressor station No. 5, 20 miles south of Quesnel, B. C., September 1. This will complete cleaning, purging, and packing of the line.

Then Westcoast will start transporting gas to major cities in British Columbia, including Vancouver, as well as to Pacific Northwest markets now being served by San Juan basin gas. Initial capacity will be 400,000,000 cu. ft. daily. Extra compressor horsepower now planned, perhaps within 2 years, will raise capacity to 660,000,000 cu. ft. daily.

Canadian Bechtel, Ltd., managed the construction project, which was finished well ahead of schedule. Full-scale construction didn't start until the spring of 1956. The Canadian Rockies posed major problems for contractors, but these were met to make possible the early completion.

Contractors were Mannix, Ltd.; Canadian Bechtel; R. A. Conyes Construction Co.; and Dutton - Williams Brothers, Ltd. Ford, Bacon & Davis, Ltd., was consulting engineer. (For a detailed story of the planning and construction of Westcoast pipeline, see page 122.)

Florida Line Review Sought

WASHINGTON.—Florida fuel-oil dealers will attempt to win a review of the Federal Power Commission's approval of the Texas-to-Florida natural-gas pipeline.

A law suit, filed last April by the Florida Economic Advisory Council, will be argued in the District of Columbia Federal Court of Appeals in September. The council is made up of more than 100 Florida fuel-oil dealers.

But Houston Texas Gas & Oil Corp., which won Federal Power Commission approval to build the line earlier this year, is going ahead with plans to begin construction this fall.

—— *Industry* briefs

La Gloria Oil & Gas Co. stockholders have voted final approval of Texas Eastern Transmission Corp.'s share-for-share merger deal. La Gloria, which has a million shares outstanding, will operate as a subsidiary of Texas Eastern. No change in management is planned.

Texas' deepest hole has been rescheduled to go another 1,000 ft. to 20,200 ft. in search of the Devonian. The 1-CS University, a remote West Texas wildcat in Pecos County, resumed drilling after a week of running electric logs, and was inching on down to 19,140 ft. last week.

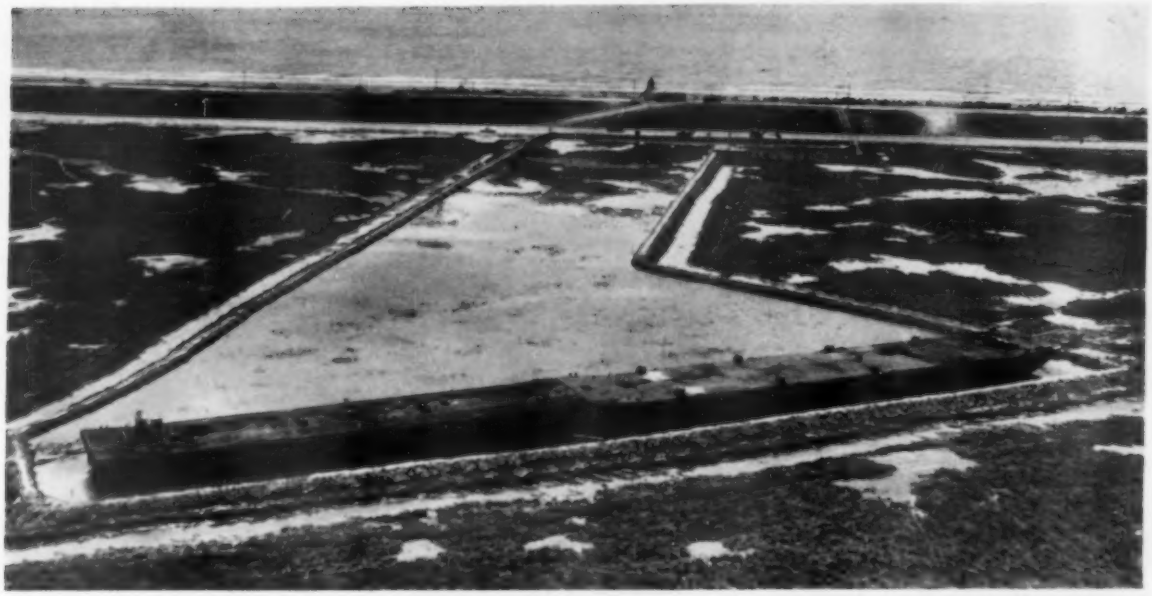
The test is being drilled by Pan American Petroleum Corp. and Gulf Oil Corp. It took the state's depth record away from Magnolia Petroleum Co. earlier this month. Previous record holder was Magnolia's 417-A West Ranch in Jackson County on the Gulf Coast, which went to 19,060 ft. in 1955.

Arkansas Louisiana Gas Co. is going into the air-conditioning business with the purchase of All-Year Gas Air Conditioning Division of Servel, Inc., Evansville, Ind. The $4-million deal—subject to stockholders' approval—involves $1 million for inventory and $3 million for other property.

Todd Shipyards Corp., Houston, will build a submersible-type drilling barge for Union Producing Co., Shreveport. The vessel will be designed to operate in as much as 76 ft. of water and will be equipped with a rig capable of drilling to at least 20,000 ft. Delivery is expected next April.

Signal Oil & Gas Co. plans to build a 22-story office building in downtown Los Angeles. It will be the tallest commercial building in the city, which until this year had a 13-story height limit on structures. The building site is just across the street from the General Petroleum Corp. and Richfield Oil Corp. buildings, and near Superior Oil Co.'s new building.

The Paradox basin's first big natural-gasoline plant will be built at Utah's Aneth field by The Texas Co. The plant, which will cost a minimum of $6 million, will recover butane, propane, and natural gasoline. Dry gas will be marketed or used for secondary recovery. Other operators in the area are expected to participate in the project. Construction will begin as soon as arrangements for equipment can be made.



It's Back to Sea for Storm-Tossed Barges

BEAUMONT. — Two oil barges which were washed ashore by Hurricane Audrey 7 weeks ago are being floated back to the Gulf of Mexico through a series of man-made lakes.

The vessels were swept from the Intracoastal Canal June 27 and marooned on the coastal prairie some 1,500 ft. from the gulf.

An elaborate salvage plan was drawn up by Jones Boys Moving Contractors, Beaumont. It called for construction of three temporary lakes to float the wayward barges back to deep water. The overland journey is expected to cost about $20,000.

The first reservoir (shown above) covered about 5 acres. Water, coming through a 20-in. line laid to the gulf, was pumped into the temporary lake to a depth of 24 in.

Second phase of the salvage operation was construction of a lake to float the barges across State Highway 87 south of Beaumont. Highway traffic was detoured around the barges. The third lake was to extend into the edge of the gulf.

The barges, owned by Alamo Barge Lines, Houston, were caught by Hurricane Audrey near Gilchrist, Tex. They were returning empty to Rockport, near Corpus Christi, after unloading crude-oil cargoes at Port Arthur. When empty, the vessels draw only about 18 in.

One of the barges, measuring 225 ft. long and 38 ft. wide, has a capacity of 12,000 bbl. The other holds 9,000 bbl. After their rescue they will be moved to dry dock for inspection and necessary repairs.

Brownell May Keep Foreign-Supply Committee

WASHINGTON.—The Department of Justice ruled last week that the voluntary agreement on foreign petroleum supply may be continued as a safeguard against another "Suez crisis."

The "defense necessity" for the agreement, under which 16 companies operating abroad collect world-wide supply and demand data for the military, outweighs the "antitrust potentialities" of the arrangement, Atty. Gen. Herbert Brownell, Jr., reported to Congress.

The agreement was the basis on which the Middle East Emergency Committee was set up to arrange the European oil lift following the closing of the Suez Canal last year. The MEEC was dissolved last month when oil supplies for Europe returned to normal.

Continuation of the Foreign Petroleum Supply Committee was urged by Interior Secretary Fred A. Seaton, Mobilization Director Gordon Gray, and Perkins McGuire, assistant secretary of Defense.

The committee now is aiding the Military Petroleum Advisory Board in a new study of world-wide supply and demand, McGuire disclosed. It is also providing information "vital to the mobilization planning of the Government," he said.

The three officials, Brownell pointed out, "have emphasized the importance of the continuous function of collecting data on foreign petroleum operations, as well as the necessity for maintaining the emergency functions of preparing possible future plans of action—subject to my approval—upon the occurrence of a crisis threatening the petroleum supplies of the free world."

Antitrust safeguards . . . The committee will work under the antitrust safeguards written into the agreement last year, Brownell said.

These include a requirement that all meetings have a full-time government employe as chairman and that a government staff and not the committee shall handle the figures sent in by the individual companies.

The setting up of the government staff, interrupted by the Suez crisis, is being renewed, Brownell reported.

Both the MEEC plan of action and the foreign petroleum supply agreement are strongly criticized by the Senate antitrust subcommittee which investigated the European oil lift last

winter. The subcommittee's report is due to be released soon.

The MEEC's final report is now in the hands of the Interior Department and also will be published shortly.

How's Conoco Doing? Teachers Invited to Supply the Answers

HOUSTON.—Continental Oil Co. has invited a group of 10 educators to tell the company how to run its business.

Continental President L. F. McCollum said the school men, from colleges and universities in various parts of the country, would participate in an unusual 2-week "visiting professors' seminar" beginning August 19. The company has asked the visitors to study its operations and policies and to submit their analyses and suggestions at the end of the seminar.

First day of the seminar will be spent with Conoco's top management. After that, the educators will spend 7 to 9 days studying company operations pertinent to their own educational fields. They will visit company installations in the Southwest, Midwest, and Rocky Mountain areas.

"We want an objective, outside examination and evaluation of our overall operations and our management to aid us in identifying possible problems and weaknesses," McCollum said.

"After 2 weeks of studying our business and talking with both our line and staff personnel, the professors will be asked for frank impressions and suggestions."

Bids Open for Prison Farm

HOUSTON.—The city of Houston, already collecting more than $20,000 a month in oil royalties on a city-owned garbage dump, is hoping to get gas production on its prison farm.

The city council has voted to advertise for lease bids on the 331-acre prison tract at the south edge of the city. Several gas wells were recently drilled near the farm.

The acreage is about 2 miles southeast of the Holmes Road garbage dump where Trice Production Co. has completed 10 oil producers within the past year. The company completed its first producer on the fly-invested dump last summer, flowing 183 bbl. daily through 14/64-in. choke from the Vicksburg sand at 8,102-14 ft.

The city dump production is on the east flank of the Pierce Junction field which was discovered in 1921.

House leaders say not now, so . . .

Gas Bill Shelved Until 1958

WASHINGTON.—The Harris gas bill has been shelved until Congress meets again next January.

The decision not to bring the bill up on the House floor this year was made by Democratic leaders. They feel it will have a better chance next year, despite the approaching elections, House Speaker Sam Rayburn explained.

Rayburn said the nerves of congressmen are a "little unstrung" by the long session and the many controversial issues brought up. It is no time to start another bitter fight.

Rayburn previously had said he would not bring the bill up unless satisfied it would pass. The move to put it on ice indicated there was no assurance that it would be approved at this time.

The final word on the bill came after a poll of the House. The result was not disclosed. But reportedly the measure couldn't muster enough support to pass by even the six-vote margin it had 2 years ago.

The Harris bill got out of the House commerce committee by a slim two votes. It was reported by the House rules committee by the same slender margin.

The poll is said to have shown that a majority of the Republican congressmen would vote for the bill. But the vote would not be as good as in 1955. Fewer Democrats also would back the measure than did so 2 years ago.

The big question was what influence the eight hours of debate allowed by the rules committee would have on the vote. A number of members refused to say how they would side on a final showdown.

Next year's chances . . . The cooling off period now given the bill isn't going to help its chances, many believe. Every seat in the House will be at stake in next year's elections. So, many congressmen seeking reelection are seen as voting to suit their constituents rather than to express their convictions. And there are few consuming areas where the gas bill would not be an issue against congressmen who voted for it.

If the bill does get through the House, however, it will have easy going on the other side of the Capitol. The Senate offers no problem. It passed the bill in February 1956 by an easy majority.

But many in the industry—and some in Congress—are wondering if the Senate will get a chance to vote on the measure.

Wildcat Heads for 20,000 Ft.

OKLAHOMA'S deepest hole is steadily getting more so.

Magnolia Petroleum Co.'s record-breaking deep test, the 1 Sterba-Orodovician in Caddo County, at mid-week had reached 19,405 ft. and was making hole steadily at an average rate of 30 ft. a day.

At that depth, the wildcat was 1,247 ft. below the former record depth of 18,158 ft. chalked up by the Frankfort 1 Pruitt, a dry hole completed in Grady County last year.

The wildcat, which is aimed at the Bromide sands in the Simpson section found so prolific in Grady County last year by British-American Oil Producing Co., was drilling in shale.

Magnolia geologists, lacking a definite marker, were able to say definitely only that the test is drilling through Mississippian rocks somewhere between the Springer and the Woodford shale. However, they feel that the bit must have reached the middle Mississippian by now.

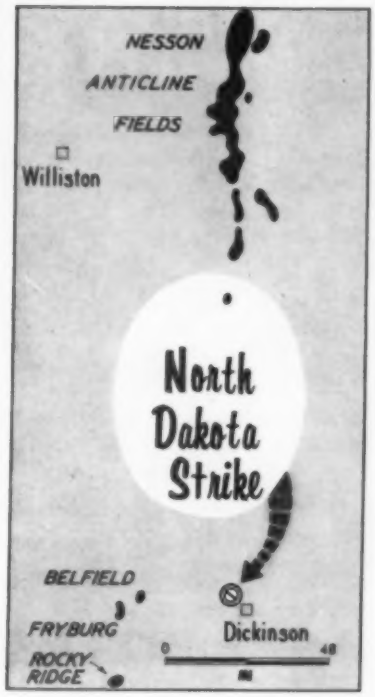
Magnolia won't know for sure exactly where it is until the well tops some definite marker like the Sycamore lime or the Woodford.

World record? . . . The test now appears almost certain to go to at least 20,000 ft. barring unforeseen trouble. The Bromide sands target still is a long way off. It's even conceivable that the 1 Sterba might threaten the world depth record of 22,570 ft.

Operator now is making hole easily, and hole condition is good. If it stays that way, chances are that Magnolia and its partners will go on down below 20,000 ft.

However, trouble could develop. The 1 Sterba now is carrying almost 4,900 ft. of open hole, almost all of it shale. Last string of casing was 7⅝-in. set at 14,527 ft.

If caving shale should force Magnolia to run another string of casing, chances of reaching the Bromide would be small. As of now, the long stretch of open hole through the shale is standing up well.



Dakota Test Hits

Leach discovery touches off new interest in area

BISMARCK, N. D.—Southwestern North Dakota may have its second significant discovery of the year at the Leach Oil Co. et al No. 1 Kalanek in Stark County.

The rank wildcat recovered 3,550 ft. of oil and 450 ft. of heavily oil and gas-cut mud on drill-stem test of the Nesson-Mississippian at 8,749 to 8,808 ft. Another drill-stem test was being run at 8,810-35 ft.

The wildcat is 26 miles northeast of the Rocky Ridge-Heath field, which Northern Pump Co. discovered in January at the 1 Fritz. This well flowed more than 50 bbl. of oil per hour on a 5½-hour test of the Heath sand at 8,055-72 ft.

This was one of the most prolific Heath discoveries in Williston basin history. It touched off a lot of interest in southwestern North Dakota.

Nearest production to the new discovery is 20 miles to the west at Belfield pool, where production is from the Amsden and Mississippian. Near Belfield is Fryburg field which has been producing from the Heath since 1954.

But there is no other production between the Belfield-Fryburg area and the new discovery. Nor is there any production between this whole general area and the south end of the Nesson anticline 40 miles to the north.

Pipeline briefs

Texaco-Cities Service Pipe Line Co. started work last week on another section of its 168-mile, 6-in. L.P.G. line from East Chicago, Ind., to the Grand Rapids, Mich., area. M. L. Hulcher Co., Inc., Virden, Ill., was awarded 53 miles from South Bend to East Gary, Ind. This spread will be completed in 40 days.

Somerville Construction Co. is laying 98 miles from Lowell, Mich., to South Bend. Morrison Construction Co. has the contract for the 17 miles from East Chicago to East Gary. Pump stations will be built at East Chicago and Grand Rapids. Deliveries of L.P.G., transported to East Chicago from the Mid-Continent through Texaco-Cities Service's crude line, will be made at East Chicago, South Bend, and in the Grand Rapids area.

Alberta Gas Trunk Line Co., Ltd., has completed the 34-in. portion of its gathering system for Trans-Canada Pipe Lines, Ltd. Fulton Banister, Ltd., the contractor, has laid the 17-mile, 34-in. line which links with Trans-Canada at Burstall, Sask., and is proceeding on the 100 miles of 18-in. to Provost, Alta.

Western Slope Gas Co., Denver, will build a 36-mile, 4-in. gas line this fall from Piceance Creek field, northwestern Colorado, to Rifle, Colo. Contracts will be let soon. The project is to be completed in October.

Skelly Oil Co. will lay 50 miles of 12-in. crude pipeline this fall between Cunningham, Kans., and Burton, Kans. The new line will replace Skelly's partially looped 6 and 8-in. system. The project will be completed before the end of the year.

Northern Natural Gas Co. has contracted with Pan American Petroleum Corp. and Humble Oil & Refining Co. for gas reserves totaling 227,960,000,000 cu. ft. in North Hansford area, Texas Panhandle. These contracts give Northern Natural 445,071,000,000 cu. ft. of gas in this area. Daily delivery expected from the fields is 57,400,000 cu. ft. The FPC has approved sales certificates and pipeline facilities to tie the new gas in with Northern Natural's system.

Shamrock Pipe Line Corp. is building a 44-mile, 4 and 8-in. crude line from Hansford County to Moore County in the Texas Panhandle. The 14 miles of 4-in. is being built by H. A. McGinnis Construction Co. The 30 miles of 8-in. has not been awarded. The project is to be completed by September 15. Shamrock recently completed 61 miles of 3, 4, and 6-in. crude line from Hansford to Ochiltree County, also contracted to McGinnis. The construction reflects increased development in the Texas Panhandle.

Natural Gas Storage Co. of Illinois has been authorized by the Federal Power Commission to develop its proposed Cooks Mills underground storage facilities in Coles and Douglas counties. Withdrawal capacity will be 25,000 M.c.f. daily for 36 consecutive days. Included in the $3,729,000 project will be nearly 15 miles of 20-in. pipeline, 3½ miles of field lines, and a 1,650-hp. compressor plant.

Coastal States Gas Producing Co. is building a $1-million, 45-mile gas-gathering system in Bee County, South Texas, to deliver gas to Texas Eastern Transmission Corp. Coastal also has purchased half interest in the 20-mile Duval Gas Gathering System. The company will own half of the Bee County system, which will be connected to two fields with reserves exceeding 70 billion cubic feet dedicated to the system. Coastal now operates 20 gathering systems and has three others under construction.

Also for Pipeliners . . .

Final briefs have been filed in the hot fight between Lone Star Gas and Christie, Mitchell & Mitchell and Warren Petroleum over merging gas production in Jack and Wise counties, Texas, into one field (p. 100) . . . The FPC has recessed hearings on Midwestern Gas Transmission's application until August 26 (p. 100) . . . Westcoast Transmission paid a top price in signing contracts to cover all producers in Alberta's Savanna Creek field (p. 104) . . . Westcoast also has completed ahead of schedule its big line to the international border near Sumas, Wash. (p. 105) . . . The Harris gas bill is dead until 1958 (p. 107).

PLUS THESE TECHNICAL FEATURES: Westcoast's big-inch gas line is the end of a 20-year struggle (p. 122) . . . The story of Trans-Canada, world's distance champ of pipelining (p. 235) . . . and Pipeline Patrol's construction report (p. 241).

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Cities Service geologist examines first Dhofar crude.

Oman Fight Affects Oil

● British troops are protecting interests in Middle East; rebellion is threat to authority of sultans in oil nations

THE DESERT fighting in Oman is pretty small potatoes as military actions go, but as the scrap drags into its second month it has proved two things:

. . . **There is oil** worth fighting for in southern Arabia.

. . . **The British** may have a far bigger political problem in that region than anyone believed at first. This political problem conceivably could affect the oil found by Americans.

The newly announced oil strike at Dhofar by Cities Service Co. is located many miles southwest of the shooting in Oman, but the entire southern Arabian peninsula is tied together politically. The Sultan of Muscat and Oman also is the civil ruler for Dhofar.

Drilling progress . . . Cautious Cities Service Co. probably would have kept its oil discovery under wraps a while longer if the troubled political situation had not forced its disclosure early this month. The company somewhat reluctantly admitted it has a pair of 2,000-bbl. daily wells on a large structure called Marmul about 35 miles from the southern coast of the Arabian peninsula (OGJ, Aug. 5, p. 62).

The company still is saying very little about its discovery. The first of the two wells, 1 Marmul, was drilled a year ago. At that time Cities Service confirmed widespread reports it had encountered a show of oil but discounted its importance.

Two more wells were drilled about 25 miles to the north at Mazraq. Then the company drilled a 2½-mile southeast offset to 1 Marmul. The offset, according to Cities Service, will produce 2,000 bbl. daily of 22-gravity crude from about 3,200 ft.

After drilling the second Marmul well into the pay, the company said subsequent testing of Marmul No. 1 shows it will produce at the same rate as No. 2.

The Marmul structure, 5 miles wide and 11 miles long, will be developed by a light rig the company moved into Dhofar after the first well was drilled. A second and heavier rig will continue to test other structures in the 32,000-sq.-mile concession.

The trouble . . . The British apparently have gained at least a limited military victory for the Sultan of Muscat and Oman. It was an operation that would have made Rudyard Kipling a fine plot.

Superior British-led forces last week had routed the rebellious Imam of Oman, but there are serious doubts the war is entirely over.

The trouble has been brewing for years and flared into a shooting situation 2 years ago. At that time the Sultan's desert troops squelched the uprising easily and in a short time.

But this time it is taking British jet planes, modern weapons, and a double column of troops in a desert foray.

The Imam is theoretically a religious leader who owes his civil loyalty to the Sultan of Muscat and Oman. A treaty negotiated by the British in 1920 between the Sultan and the Imam granted the Imam semi-autonomous powers in the interior region of Oman, where he holds sway.

In recent years the Imam apparently has developed ambitions to become ruler of the area and independent of the Sultan entirely. It has now become a question of which tribes in Oman are loyal to the Sultan and which are loyal to the Imam.

The British became involved because of their protector position. The Sultan called on them for help, and the British had to respond or face the possibility of losing influence in other Middle East shaikhdoms where they occupy a similar position.

Chain reaction . . . While the Cities Service operation in Dhofar is a long way from the scene of the fighting, it could be affected.

Cities Service and Richfield got the concession from the Sultan of Muscat and Oman. If the Imam of Oman could successfully challenge the authority of the Sultan in an area between Dhofar and Muscat, he could disrupt the Sultan's control of the entire area.

All reports from Oman last week indicate that the Imam has taken his followers to the Jebel Akdar mountains in retreat. If he can enlist the support of Suleiman Bin Hanya, who rules the mountain tribes, both the British and the Sultan could have more trouble.

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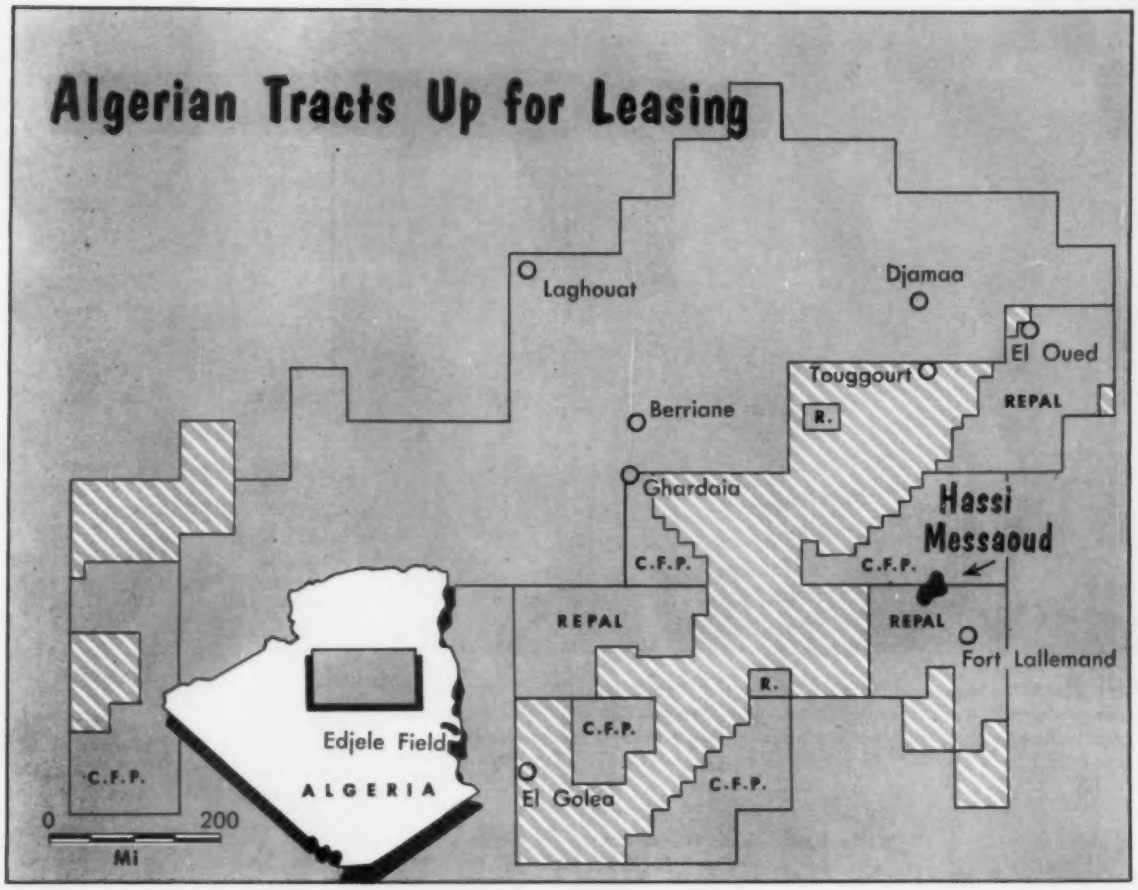

World invited to join the hunt as . . .

French Offer Concessions in Algeria

The Central Algerian desert may become the scene of a new oil land rush in the next 3 weeks.

More than 23,000 sq. miles of one of the world's hottest exploratory areas is open for new business. The French expect more than 20 applicants for concessions. Major companies, large and small independents, and individuals already have shown an interest.

The only hitch is that the French require at least 50 per cent French participation in any concession granted. Some of the majors are lukewarm to the idea of sharing an oil search in this way, but independents hungry for foreign oil prospects don't mind.

The requirement does not specify that the Gallic interest be the government, but a minimum of one-half interest in any venture must be French.

Applications must be completed and filed by September 10 with four government bureaus, three in Paris and one in Algiers. Because of the interest already shown in Algeria, the French Government thinks 30 days is plenty of notice.

How it stands now . . . The Royal Dutch-Shell Group is the only foreign capital now at work in Algeria. Five French companies have all the exploratory acreage, and four of them are government-controlled. Shell has the majority interest in one and a minor interest in another.

Nearly 5 years ago the government pretty well divided Algeria among the five companies with 5-year exploratory licenses covering most of the country. Under French law, half the acreage in such a permit must be surrendered at the end of the first term. That's what is opening Algeria today.

Two of the five companies electrified France with discoveries in Algeria and now are giving up part of their acreage.

Cie. Francaise des Petroles (Algerie) and Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN REPAL) hold licenses on 10 tracts in this region of Algeria. Each is surrendering half the acreage in 6 of the 10 permits. Total acreage in the six is almost 47,000 sq. miles.

A large portion of the newly released land lies to the west, north, and southwest of the Hassi Messaoud discovery that gave France great oil hopes in Algeria. The two companies have pooled their efforts on the permits they hold and are developing Hassi Messaoud and two other promising finds on a joint basis (OGJ, June 17, p. 120).

Exploratory permits held by the other three companies operating in Algeria also will come to the end of the first 5-year period this fall and next year. Portions of these licenses will be available as they terminate and the companies can then make

Oil Rush: Strikes in Algeria and activity in other French possessions have produced a wave of oil-stock buying in France. More than 2,000 persons recently lined up outside the Netherlands Bank in Paris to subscribe to an issue of shares in a French Equatorial Africa oil company. The rush continued all day.

a choice of what they want to hold.

How to apply . . . The notice that acreage will be available appeared August 9 in the Journal Officiel de la Republique Francaise. It said applications would be accepted beginning the following day but none after September 10.

All applicants must satisfy the French Government they have adequate financial backing and technical experience to carry out a search for oil. Once this is done, the government has the arbitrary right to approve the application or ignore it.

Exploratory licenses are granted for periods of 3, 4, or 5 years, depending on the size of the area applied for. Those granted in Algeria probably will be for the 5-year maximum period. The applicant must agree to minimum expenditures, which vary under French law.

No bonus is required, and there is no tax on an exploration permit. Unless special regulations have been imposed on the Algerian operation, it will be governed by the standing French oil law, since Algeria is considered a part of metropolitan France.

The basic requirements are that companies must satisfy the French as to financial and technical ability. Then comes the paper work. Copies of the application must be filed with the Sahara Ministry in Paris; the Secretariat d'Etat a l'Energie, Direction des Mines in Paris; Direction des Carburants in Paris; and Chef du Service des Mines d'Algerie in Algiers.

Why the interest? . . . The French are banking heavily on crude from Algeria to meet France's internal oil needs. They are talking in terms of 4,000 bbl. daily of Hassi Messaoud crude shipped to the Mediterranean by the end of the year and oil independence within 3 years (OGJ, July 29, p. 123).

A short time before the announcement of acreage available in this same region of Algeria, the government oil agency, Bureau de Recherche de Petrole, revealed some new facts about the Hassi Messaoud well.

Initial tests were made of a section from 10,922 to 11,228 ft. which produced about 630 bbl. daily of 45°-gravity oil through a 5-mm. choke with a gas-oil ratio of 190:1.

The formation has a porosity of 7 to 12 per cent and permeability of from 1 to 8 millidarcys. Bottom-hole pressure was 7,105 psi. and wellhead pressure 2,305 psi.

The French say the three producers so far completed on the Hassi Messaoud structure have established "conservatively" reserves of 700,000,000 bbl.

Two New Groups Log Pay Sands on Maracaibo Leases

OPERATORS exploring in Lake Maracaibo's newest concessions are beginning to get a better idea of how good their acreage is. Two new discoveries are indicated by San Jacinto Petroleum Corp., and Signal Exploration Co.

San Jacinto and associates reported at least 125 ft. of prospective pay at their 1 Marlago in Block V-575. Signal reportedly encountered 100 ft. of sand in its Centro 2X, second test on its 28,000-acre Maracaibo lease.

The 1 Marlago is San Jacinto's first test on a 2,000-acre concession which San Jacinto and six associates obtained from Venezuelan Leaseholds, C. A.

Mud and electric logs indicated productive zone between 11,031 and 11,330 ft., where the well was reportedly still in lower Miocene pay. Last week the well was deepened to 11,444 ft., and operators were preparing to set 9⅝-in. protective casing.

San Jacinto plans to resume drilling to test the Eocene formation down to at least 13,000 ft. No tests are planned until the wildcat reaches total depth.

Signal's strike . . . The pay indicated in Signal's Centro 2X is in the "B" zone at 9,800 ft. However, so far as is known, no formation tests were made. The operator plans to drill ahead to the Cretaceous as soon as a fishing job is completed.

The well is in the southern part of the big concession, 4½ miles south of Signal's first well, the 1 Centro Largo. This well reportedly had good oil shows and possibly will make a small producer. It has been temporarily capped at total depth of 9,470 ft.

Signal is operator on the lease for Pure Oil Co., Standard Oil Co. of Ohio, Hancock Oil Co., and Signal Oil & Gas Co.

San Jacinto has 30 per cent interest in the 2,000-acre concession on which the 1 Marlago is located. Other owners are Tennessee Gas Transmission Co., Union Oil & Gas Corp. of Louisiana, Lion Oil Division of Monsanto Chemical Co., and Murphy Corp., with 15 per cent each, and Sharples Oil Corp., and American Petrofina, Inc., which jointly own 10 per cent.

The San Jacinto wildcat offsets Mene Grande Oil Co.'s 1 Ceuta, which blew out and caught fire several months ago. The 1 Ceuta lies between acreage on the eastern edge of the lake held by Mene Grande.

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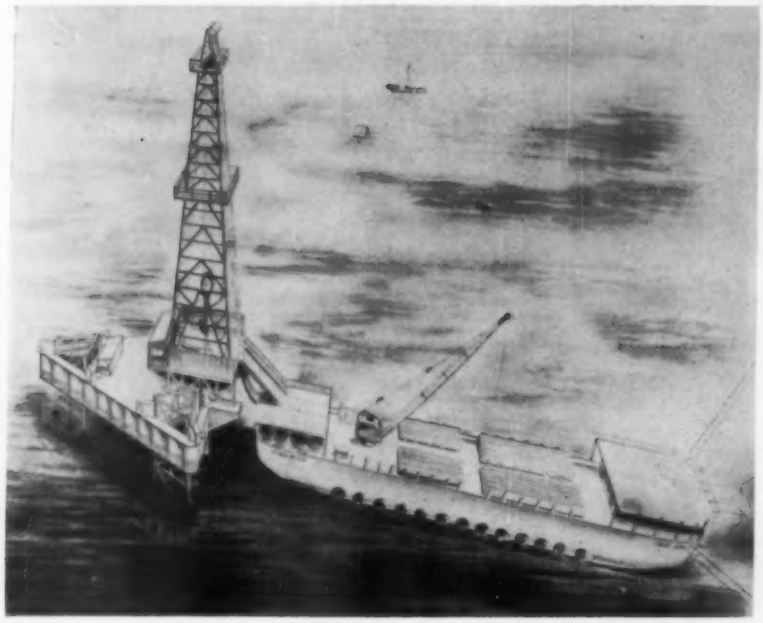

Persian Gulf drilling to spurt: . . .

Aramco Buys New Mobile Rig

A STEPPED-UP offshore drilling program in the Persian Gulf off Saudi Arabia is in the mill.

Arabian American Oil Co. has ordered a new low-priced small-sized mobile offshore drilling rig, which operates with a platform tender.

While the rig probably will be used first in the fast-developing Safaniya offshore field, it can be moved some 25 miles south to another Persian Gulf structure at Manifa.

The new mobile rig ordered by Aramco will be built by R. G. LeTourneau, Inc., and is scheduled for delivery in 5 months. LeTourneau says the sale price is "less than $750,000."

The rig is distinguished from other junior-sized mobile units because virtually all supplies and crew accommodations will be located on a tender.

Triangular in shape with three lattice-work legs, the rig will be raised and lowered by electric motors geared directly to steel cogs running the length of each leg.

Diesel generators located on the drilling platform will supply electric power to operate the legs.

Complete sections of the platform will be fabricated at LeTourneau's headquarters plant at Longview and transported by truck and rail to the company's marine facilities at Vicksburg, Miss.

Up to now, Aramco has used a submersible barge, the "Queen Mary," for its offshore work at Saudi Arabia and followed up with construction of permanent platforms.

Sights raised . . . Aramco has raised its production goal at Safaniya again and now expects to hit 190,000 bbl. per day by 1958. Last year the 1958 production target was only 125,000 bbl., and the goal was raised to 175,000 last April.

Current production at Safaniya tops 100,000 bbl. On August 2 the twenty-seventh well in the field—25 of them offshore—was drilled. Drilling required just 20 days and 21 hours to the pay zone at 5,438 ft. It was a new drilling record for the field.

The 190,000 bbl. production goal means that four booster stations must be added to the new pipeline which connects Safaniya with the Ras Tanura refinery and loading terminal.

If the Manifa field develops, crude can be carried to Ras Tanura through the same line.

Saudi Arabian officials are pressuring Aramco to speed up its offshore drilling. Kuwait and Iran are talking of granting offshore concessions in the Persian Gulf, and this has spurred Saudi Arabia to increase exploration.

Safaniya itself is the Middle East's first offshore field and probably is the biggest yet discovered in the world.

Action is expected soon to drill test Manifa to the south, where only core testing and marine seismic work has been done so far.

Mattei Deals Again

Turns to private capital to finance search in Iran

ENRICO MATTEI, top man in Italy's state-controlled oil enterprise, is looking to private capital to finance his exploration deal with Iran.

Mattei revealed last week the answer to the question that has puzzled the industry—how he plans to finance a full-scale exploration program outside Italy when his agency can't develop an internal industry (OGJ, Aug. 12, p. 93). He's going to offer private Italian capital 49 per cent of a company that will take over the Italian interest in the Iranian deal.

The head of Ente Nazionale Idrocarburi said in Rome last week that plans call for capitalizing the new company at 10,000,000,000 lire (about $16 million at the official exchange rate) in 10,000-lire shares ($16 each).

Protects control . . . Mattei revealed also that his plans will make it impossible for any private stockholder to obtain control even of the 49 per cent minority interest available to the public. No investor will be allowed to buy more than 20 shares.

The private-financing move is regarded as the latest in Mattei's canny moves to conduct Italy's oil industry as his private little domain.

Small private investors in Italy are almost certain to jump at a chance to invest in the Iranian scheme because of the magic that surrounds Iranian oil. Too, it will be a patriotic move on their part aimed at making Italy less dependent on "foreign oil companies" for its fuel supply.

Jordan Eyes Lease Grants

THE GOVERNMENT of Jordan revealed last week that two-thirds of the country's territory is now covered by oil exploration concessions and the remaining third may be granted to the Italians.

Khoulousi Khairi, Jordanian Minister of Economy, said his government is ready to grant a concession covering a third of the country to George Zimeri, Guatemalan financier.

The first concessions in the country were granted to Edwin Pauley, California independent operator, who spudded his first well last month (OGJ, July 15, p. 81). Pauley made his deal 2 years ago and was given 8 months to pick the one-third of the country he wants to explore.

Khairi said the remainder of Jordan may be granted to Italian companies.

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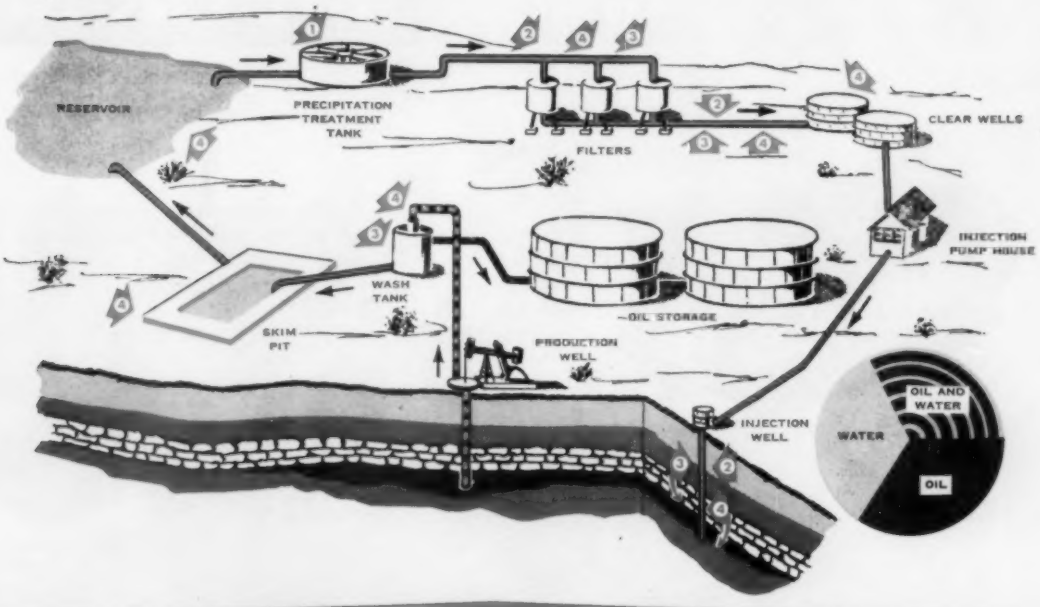

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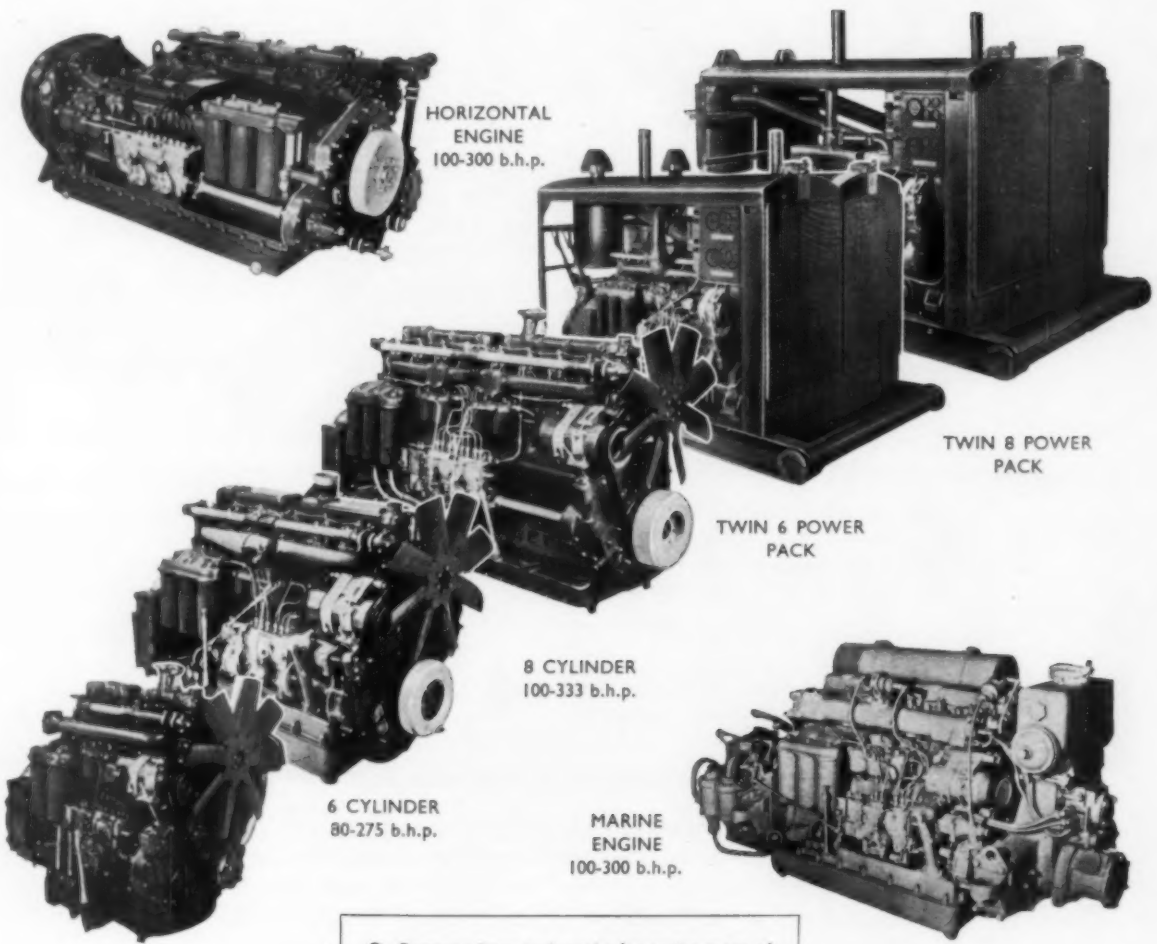

HORIZONTAL ENGINE
100-300 b.h.p.

TWIN 8 POWER PACK

TWIN 6 POWER PACK

8 CYLINDER
100-333 b.h.p.

6 CYLINDER
80-275 b.h.p.

MARINE ENGINE
100-300 b.h.p.

4 CYLINDER
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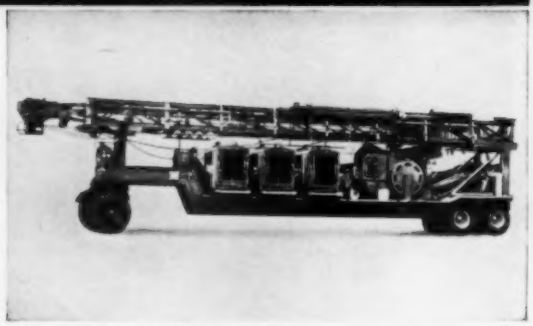
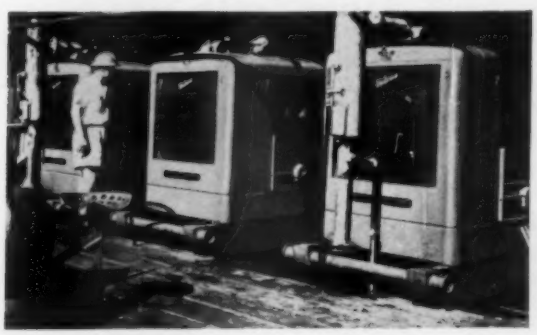


Woodfield Hoist Drilling Rig — Trinidad

Scammell Constructor — Ras Duqm, Oman

Woodfield Hoist Servicing Rig — Seria, Borneo



Petbow Generating Set — Seria, Borneo

C.P.T. Air Compressor — Iraq

ROLLS-ROYCE

OIL ENGINES

ROLLS-ROYCE LIMITED, OIL ENGINE DIVISION, DERBY, ENGLAND

At Russia's mountain of oil . . .

Big Plans Loom for Oil Sands

RUSSIA MAY BE getting set to go into the oil-mining business in a big way.

To develop oil-bearing sands on Kirmak Mountain near Baku, Russia has been operating a thermal cracking plant, a compressor station, and other production facilities. Several thousand barrels of oil has already been recovered through the process.

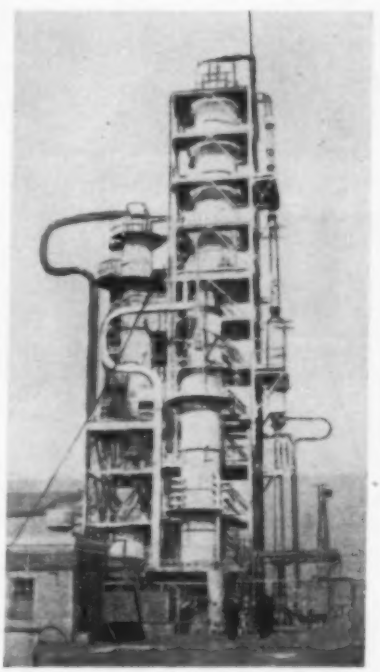
Apparently satisfied with results of the pilot operation, Russia now appears ready to launch a full-scale operation. Plans are being worked up for a large industrial plant to mine and process the sands.

While Russia is just getting around to developing her "oil mountain," there is nothing new about the discovery. The area has supplied local residents with oil for over half a century. Saturated oil sands outcrop on the surface in many places and shallow pits filled with oil dot the entire mountain. In the past when the residents needed oil, they just dipped it out with buckets.

When the government decided to develop the area, it moved big excavating shovels onto the mountain for open-pit mining. Sands containing an average of nearly 30 gal. of oil per cu. yd. are loaded onto trucks and moved to the nearby refining facilities.

The thermal plant heats the oil to about 750° F., breaking part of it down into gas, coke, and liquid, including diesel fuel and gasoline-ligroin fractions. Light ends are evaporated, then cooled and run to storage tanks.

Coke produced by the thermal processing of the sands is used as fuel to operate the plant. Even the depleted sands do not go to waste. They are used to make building blocks.



PILOT THERMAL plant heats oil from sands to 750° F. Full-scale replacement is planned.

Shoe-Horn Refinery

60-acre site isn't holding up big expansion project

IN COMPARISON with new refineries laid out on spacious grounds, an expansion under way at a Japanese plant will fit facilities as tightly together as an Oriental puzzle box.

Toa Nenryo Kogyo, Ltd., is enlarging its 7,000-bbl. daily Shimizu refinery to 32,500 bbl. daily. The entire expansion is taking place on the same 60-acre plot that holds the original plant.

The company, in which Standard-Vacuum Oil Co. has 55 per cent interest, will have a new 25,500 bbl. pipestill on stream in December. Work on the unit started several weeks ago.

Other facilities to be packed into the 60-acre area are a Powerformer, a Hydrofiner, a continuous kerosine acid-treating unit, new emergency power-generating capacity, and additional tankage.

The Powerformer and Hydrofiner will be completed late in 1958.

To make room for the new facilities, the Stanvac affiliate will dismantle some buildings and relocate some of the tanks and the boiler house. The changes will be made without disrupting production.

Toa Nenryo also operates a 47,000-bbl. plant at Wakayama.

Japan Gets Strike

Tests indicate well has 500-bbl. daily potential

IF A NEW WELL now being tested in Japan holds up, it could add almost 10 per cent to the country's domestic oil production.

A semi-government oil agency, Sekiyu Shigen Naihatsu Kaishu (Petroleum Resources Development Co.) says that it has encountered an oil sand in the Tamugiyama district of Niigata prefecture that may produce more than 500 bbl. of crude daily. The well, drilled to 3,700 ft. in an old producing area, has been testing more than 21 bbl. an hour.

Japan's 6,000-bbl. daily total oil production comes from more than 3,500 wells, nearly all producing from shallow sands.

Within the last 2 years the government and Teikoku Oil Co. have started a concerted exploratory program to test for deeper and more prolific oil sands. Teikoku has been successful in finding deeper production in Yabase, the country's largest single field (OGJ, Feb. 18, p. 120 and April 22, p. 99).

CANADA

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Land of the future . . .

Canada is the land of the future . . . of oil and gas, unlimited. No other part of the North American Continent offers as much hope for new major oil and gas reserves as the western Canada sedimentary basin. In 10 short years, the western provinces of Alberta, Saskatchewan, Manitoba, and British Columbia have come to the fore as vital forces in the world's oil traffic. From a position of deficiency, the dominion has reached a position of self-sufficiency in this one decade—a feat most unusual in the annals of oil.

The discovery of reef oil at Leduc in 1947 was the explosive beginning of a new era in Canadian history; it is comparable to the changes wrought at Spindletop in 1901. For in these 10 years, the western plains have undergone a transformation. Prosperity from oil and gas has reached into every phase of Canadian life. A predominately agricultural economy has been catapulted into a new industrial world of oil and gas exploration, production, refining, pipelining, and petrochemicals. New towns have sprung from the very earth, old towns have been completely changed, and in the cities, gleaming new office buildings, refineries, and industrial plants reflect the new prosperity.

But Canada is only on the verge. The next decade will make the past one seem tame. Before the northern oil finders lies a vast expanse of untested prospective oil country—700,000 sq. miles of it. The projected demand for oil and gas over the next score of years will stimulate a drilling assault that will be unparalleled in American oil history. In the next 10 years alone, Canadians expect to drill 40,000 wells in an effort to locate 7½ billion barrels of new reserves to add to their present 4 billion. Gas, once a drug on the market, has suddenly become a new cash crop as hungry pipelines thrust their way across the dominion from east to west and west to east.

In this, its Annual Canadian issue, The Oil and Gas Journal paints a picture of progress. Authored by Canadians for Canadians, this series of exclusive articles exposes the thinking, the hopes, and the accomplishments that lie behind this decade of growth—a decade that has produced the Canada of oil and gas . . . unlimited.

OIL AND GAS JOURNAL

SPECTACULAR RUGGEDLY BEAUTIFUL country through Pine Pass, B. C., is traversed by Westcoast pipeline bringing gas to cities in British Columbia and the Pacific Northwest.

Westcoast's

By Charles R. Hetherington

LATE this summer the last pig will be blown and the last weld will be made in Canada's first big-inch natural-gas-pipeline system, culminating the efforts begun 20 years earlier by Frank M. McMahon, Canadian industrialist and financier and president of Westcoast Transmission Co., Ltd.

But this is only the start of the natural-gas industry in western Canada. The Westcoast story is an outstanding example of the exploitation of natural resources for the benefit of all. By the cooperation of the governments of Canada, Alberta, and British Columbia, it has been possible to put to use and develop a valuable natural resource which otherwise would have lain dormant. A new industry has been added to the economy of western Canada.

While Canada has benefited by the development of its natural resources and by the availability of gas to the residents of the Province of British Columbia, the United States has benefited by the addition of a new source of supply for natural gas so urgently in demand. With the continued development of the prolific gas fields of western Canada, Westcoast is ideally situated to expand its system to satisfy the constantly increasing demand for natural gas in western Canada and in the western United States.

Search for Gas Begun

For years, Frank McMahon sought a supply of natural gas for Vancouver, the principal city of British Columbia, and for the neighboring cities of the United States Pacific Northwest.

When earlier-day exploratory drilling in southern British Columbia and Washington State failed, Frank McMahon turned to the more promising western Canada sedimentary basin where prospects for natural-gas accumulation in quantity might be expected to be better. He formed Peace River Natural Gas Co., Ltd. to undertake, along with Pacific Petroleums, Ltd., natural-gas exploration in the Peace River area of northeast British Columbia and northwest Alberta, in that portion of the western Canada sedimentary basin closest to Vancouver, some 650 miles to the south. Success attended these efforts and it was not long before vast quantities of natural gas were discovered, available for use in western Canada and for export to the western United States.

Export sought . . . In order to provide an adequate outlet for the tremendous proved and potential gas reserves of the Peace River area and to make the transmission of such gas economically attractive, larger markets were required than those available in the populated centers of British Columbia (1951 population 1,165,210). Accordingly, export of natural gas to the neighboring western United States was required.

While the procedures for obtaining authorization for the construction and operation of natural-gas pipelines in the United States have been well established through the medium of the FPC, no such procedures or regulations had been developed in Canada. The early story of Westcoast was one of years of public hearings before regulatory bodies and negotiations with government authorities in Canada. The company sought to establish terms upon which export of gas from Canada would be permitted and which,

Big-Inch Gas Line—First for Canada

This 30-in. line extends from Peace River to Vancouver

at the same time, would be consistent with the practical requirements for the financing and operation of the long-distance natural-gas pipeline system required.

At first most of the available gas reserves were located in Alberta and the province was concerned that the export of gas might endanger the future supply for its residents. The Government of Alberta passed the Gas Resources Preservation Act which put limitations on the right to export gas from the province and put the matter of export under the jurisdiction of the Petroleum and Natural Gas Conservation Board.

Provincial permit won . . . Hearings extended for 3 years until in 1952, Westcoast was authorized to export gas from Peace River into British Columbia. This permit, however, still had the strings attached to it as imposed by the existing law. They were later to be removed as the natural-gas picture in Alberta became more clear.

During the Alberta hearings, Pacific Petroleums made the first discovery of natural gas near the village of Fort St. John, B. C., across the border from the gas fields in Alberta. It was from this start that the development of natural gas in the Peace River area of British Columbia has mushroomed to its present proportions.

Unlike Alberta, the laws of British Columbia placed no restriction on the export of natural gas, and in fact the legislature of that province unanimously endorsed the Westcoast project to supply British Columbia communities and export gas into the United States.

Federal approval next . . . The next step was to obtain authorization from the Board of Transport Commissioners for Canada to construct an interprovincial pipeline in Canada and to obtain from the Department of Trade and Commerce a permit authorizing the export of natural gas from Canada. All of these authorizations were obtained in 1952 but here again the authorizations had strings imposed by the Federal Fluid and Electricity Exportation Act which limited the term of export permits to 1 year.

As the requirements for the long-term financing and operation of the natural-gas-pipeline project of Westcoast were made clear to the government authorities in Canada, complete cooperation was obtained; Alberta removed the unnecessary strings on the export of gas and the federal government amended its statues and granted Westcoast a 25-year export permit.

Defeat, then victory in U.S. . . . On June 16, 1952, hearings opened before the FPC in Washington on the application of Westcoast Transmission Co. Inc., a wholly owned subsidiary of Westcoast Transmission Co., Ltd., to import gas into the United States and to construct pipeline facilities in Washington and Oregon. The FPC hearings were a marathon, breaking all duration records and eventually ending in the refusal of the application of Westcoast on June 18, 1954. Instead, the FPC authorized Pacific Northwest Pipeline Corp. to supply the Pacific Northwest with natural gas from New Mexico, Colorado, and Wyoming.

As so often happens, what appeared at the time to be a crushing blow to the prospects of the Canadian natural-gas industry turned out to be a blessing in disguise. The demand for natural gas in the western United States, including California, rapidly out-

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WESTCOAST gas line extends 650 miles from Peace River fields to the U. S.-Canada border at Sumas, Wash. Fig. 1.

ROCKY, MOUNTAINOUS, FORESTED right-of-way posed major problems in construction.

paced United States supplies so that additional resources of natural gas from outside the United States were urgently required. No domestic gas supplies available to the western United States were developed in sufficient quantity to justify large pipeline construction. The one or two discoveries that were made offshore in the Gulf of Mexico were gobbled up by the pipelines already in the area supplying the eastern United States. Accordingly, the large reserve of natural gas lying nearby across the Canadian border took on a new economic importance.

On December 11, 1954, Westcoast and Pacific Northwest Pipeline entered into an agreement for the purchase by Pacific Northwest of 300,000 M.c.f. per day of surplus Canadian gas at the international border between British Columbia and the State of Washington in the vicinity of Vancouver, B. C. This latter plan was approved by the FPC on November 25, 1955.

Market opened to Canadian gas . . . With the construction of the Pacific Northwest pipeline from the San Juan basin through Colorado, Wyoming, and Utah to Washington and Oregon, a means was provided for connecting Canadian natural-gas supplies to all of the western United States. As shown in Fig. 1 the Pacific Northwest pipeline connects with the parent El Paso Natural Gas Co. which serves California and the Southwest. It also connects with Colorado Interstate Gas Co. which serves the Rocky Mountain area from the same sources as the pipelines supplying Detroit, Minneapolis, Chicago, and the whole of the midwestern United States.

By virtue of its connection with Pacific Northwest and the interconnecting grid system of pipelines, Westcoast, for all practical purposes, has available to it the entire excess market for natural gas in the western United States that cannot be supplied from United States sources.

In addition to this outstanding

THIRTY-INCH PIPE rests on siding before stringing along right-of-way.

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export market, Westcoast is the sole supplier for the cities and industries of the prosperous and growing Province of British Columbia. Through its two customer companies in Canada, Inland Natural Gas Co., Ltd., in the interior and British Columbia Electric Co., Ltd., in Vancouver and the lower Fraser Valley, Westcoast will supply substantially all of the principal centers of the province having over 60 per cent of the population.

Expansion Plans

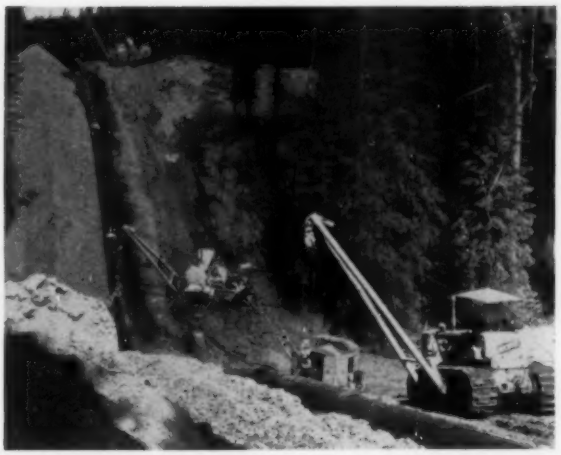
Even before the completion of initial construction, plans are proceeding to more than double initial throughput. Westcoast has contracted to supply an additional 400,000 M.c.f. per day to Pacific Northwest and demands in British Columbia are far exceeding initial estimates. Since November of 1956, Westcoast has been receiving gas from Pacific Northwest to back feed into Vancouver, B. C. And as a result of last winter's experience on natural gas, it is clear that substantially larger volumes of gas will be required for use in Canada.

In order to provide these new requirements, Westcoast plans the expansion of its main 30-in. pipeline capacity by the addition of intermediate compressor stations and the construction of a new 30-in. pipeline from the Savanna Creek field of southern Alberta, to join with an extension of Pacific Northwest's pipeline from Spokane at the international boundary between British Columbia and Idaho. Westcoast has contracted for an additional 2 trillion cubic feet of gas in Peace River fields from Pacific Petroleums, Phillips Petroleum Co., El Paso Natural Gas Co., and others, and for over 1 trillion cubic feet in the Savanna Creek field from Phillips, Northern Natural Gas Co. and others. In addition Westcoast

THE AUTHOR

Charles R. Hetherington is vice president of Pacific Petroleums, Ltd. and executive vice president of Westcoast Transmission Co., Ltd, Calgary. He is a chemical engineering graduate of the University of Oklahoma and received his doctorate from Massachusetts Institute of Technology in 1943. He was previously associated with Standard Oil Co. of Calif. and with the consulting engineering firm of Ford, Bacon & Davis. He joined Westcoast in 1952 as vice president and chief engineer.

PIPE IS LOWERED into ditch dredged in Pine River. It is anchored with concrete weights.



SMALL STREAM BED is crossed before line climbs sharp rise.

along with Pacific Petroleums, El Paso Natural Gas, and others have taken large blocks of acreage in the foothills area of southwestern Alberta in the vicinity of Savanna Creek and have already started two deep wildcat wells in search of still greater gas supplies. An application for export of the Savanna Creek gas is now before the Alberta Petroleum and Natural Gas Conservation Board.

Next will follow applications before the Board of Transport Commissioners for Canada and the FPC of the United States. It is expected that authorizations will be granted so that at least a major part of this expansion program can be completed in 1958.

The Pipeline

The 30-in. diameter by ⅜-in. wall main pipeline extends from the wheat fields of the Peace River area of British Columbia near the village of Taylor, B. C., through the Pine Pass of the Rocky Mountains, the interior valley of British Columbia, and the Boston Bar Pass of the Coast range, a total of 650 miles to a point on the international border between British Columbia and the State of Washington, in the vicinity of Vancouver. Although the pipeline travels through awe-inspiring scenery, the route follows the valleys and presents no construction or operating difficulty that has not already been met and dealt with in United States pipelining.

The Pine Pass crosses the Rockies at only 3,300 ft. elevation and here the pipeline is nowhere more than a few hundred yards from the all-weather British Columbia Government John Hart Highway from Price George to Dawson Creek. Dutton-Williams Brothers, Ltd., was contractor on this spread and finished last year.

From Prince George, the pipeline parallels the main north-south highway and the Pacific Great Eastern Railway through cattle and timber country, to a point near Merritt, B. C. This section was constructed in two spreads by Canadian Bechtel, Ltd., and Conyes Construction Co.

The only real difficult terrain is in the Boston Bar Pass through the Coast range where the elevation still only reaches 4,510 ft. In large part, the route through this area parallels the Trans Mountain Oil pipeline and the Canadian Pacific Railway until it emerges into the broad Fraser River Valley to terminate at the international border. Mannix, Ltd., constructed this section.

There are eight major rivers to cross. Two are crossed with underwater crossings. The larger six are spanned with aerial crossings. The pipe is buried to a minimum cover of 36 in., at which depth minimum gas temperatures of 28° to 30° F. are expected. Gas will be metered into the pipeline at intake points and at each sales delivery point through orifice meters. At the international boundary station, the meter station consists of 10 to 12-in. meter runs and is duplicated on the United States side of the border by a check meter installed by Pacific Northwest. At this same location gas is metered for Vancouver through 4 to 8-in. meter runs.

Canadian Bechtel, Ltd., is manager of construction and Ford, Bacon & Davis, Inc., has the engineering contract for the company.

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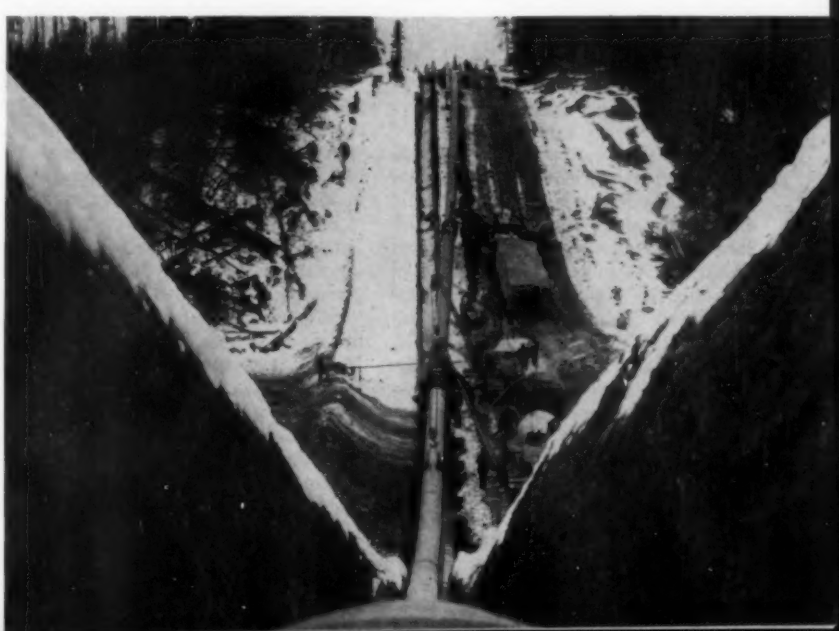


COATING AND WRAPPING machine works along right-of-way where rolling terrain calls for numerous pipe bends.

MACHINE BORES beneath road to be crossed in Fraser Valley.

SUSPENSION BRIDGE spans Quesnel River in one of five major aerial crossings on line.

Compressor Stations

Initially, four compressor stations are being installed at Stations 1, 3, 5, and 7, aggregating 52,500 hp. Station 1 will have seven 2,000-hp. Ingersolling in southern British Columbia and Rand KVS units while all of the other stations have 3,500-hp. Nordberg Supairthermal engines driving De Laval 24 by 24-in. single-stage centrifugal compressors through 10:1 stepup gears.

With this installation the pipeline will have an initial design sales delivery capacity of 400,000 M.c.f. per day. By installing intermediate Stations 2, 4, 6, and 8, and increasing the total installed horsepower to 189,000, throughput can be raised to 660,000 M.c.f. per day.

Through open conduit valves and scraper traps are installed in the pipeline between reciprocating Station 1 and Station 3 so that this first section of the line may be pigged while in operation. Beyond centrifugal Station 3 no further pipeline cleaning in operation is expected to be required.

Gas Fields and Gathering Lines

Fig. 1 shows present and planned gathering lines to the principal gas fields of the Peace River area. Pacific Petroleums, Ltd. (along with its drilling partners, principally Peace River Natural Gas Co., Ltd., Canadian Atlantic Oil Co., Ltd., Inland Natural Gas Co., Ltd., Sunray Mid-Continent Oil Co., and Permo Oil & Gas Co.) is the principal producer. This group has contracted to Westcoast Pouce Coupe and South Pouce Coupe gas fields in Alberta and the Fort St. John, Red Creek, and West Buick Creek gas areas in British Columbia. These fields, along with Gordondale field in Alberta, contracted by Royalite Oil Co. and Canadian Fina Oils, Ltd., will be tied in in 1957.

Westcoast also has contracts with Shell Oil Co., British American Oil Co., Ltd., Imperial Oil, Ltd., J. B. White & A. M. Lloyd et. al, Gulf States Oil Co. of Canada, El Paso Natural Gas Co., and Phillips Petroleum Co. Most of the fields operated by these producers will be tied in in 1958. Contracted reserves exceed 3 trillion cubic feet.

Westcoast has further contracts with Pacific Petroleums, Phillips, and El Paso Natural, providing for the supply of additional gas required in its expansion program. Under these contracts, the gas production from more than 5 million acres of productive and potentially productive land is committed to Westcoast.

In order to gather these planned additional quantities of gas along with initial supplies, Westcoast is constructing a 26-in. trunk line into Alberta fields and a 26-in. trunk line paralleling the Alaska Highway into British Columbia fields. Gas from Alberta fields is principally from shallow zones (Lower Cretaceous) and is sweet and dry so that the 26-in. Alberta gathering system is operated to handle specification pipeline gas.

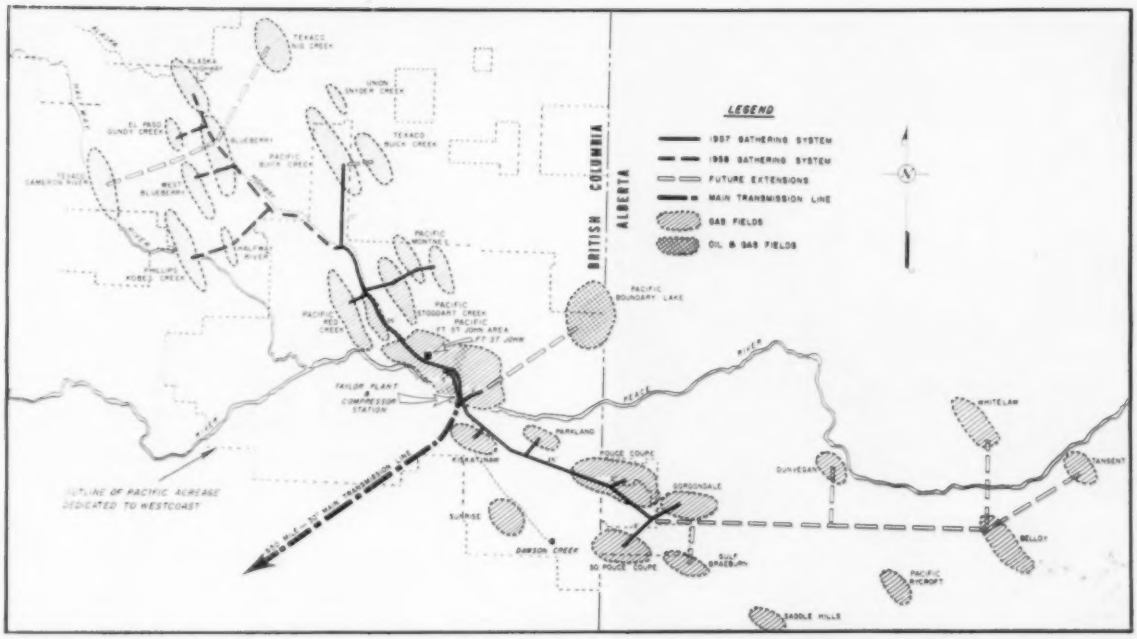
British Columbia gas, on the other hand, is largely sour and wet and requires processing to make it merchantable. In order to provide for the most economic processing of gas from the many British Columbia fields, the 26-in. gathering system will pick up wet sour gas as it is produced from the wells, and will carry both sour gas and liquids to a central gas scrubbing plant located on the Peace River at Taylor, B. C., at the start of the main 30-in. pipeline. Raw gas as received from producers will be dehydrated and it is expected that corrosion can be controlled by the use of inhibitors and by the exercise of extreme care in keeping water out of the lines.

Plant Facilities

The gas-scrubbing plant will employ amine absorption for the removal of hydrogen sulfide and carbon dioxide, oil absorption for the recovery of hydrocarbons, and solid bed dehydration. Since some two-thirds of the gas supply for the pipeline will be processed through this plant, the equipment is divided into five flow trains in order to assure continuity of operation at all times regardless of the outage of equipment. The plant is being designed to produce 300,000 M.c.f. per day of pipeline gas with provisions for expansion to 400,000 M.c.f. per day at minimum cost. Hydrogen sulfide up to 600 tons per day has been sold to Jefferson Lake Sulphur Co., which is building a sulfur manufacturing plant on an adjacent site.

Financing

Financing of Westcoast was the largest private financing arrangement in western Canadian history, based entirely on the merits of the project without government guarantee or subsidy. On May 1, 1957, the financing of some $152 million for the construction of pipeline facilities was completed. Subsequently, additional financing was completed for the construction of the gas processing plant and related facilities, bringing total financing to more than $170 million. Securities of the company consist of first-mortgage pipeline bonds, notes and debentures issued to banks; subordinate debentures sold to the public; and common stock. **End.**



OIL AND GAS FIELDS of the Peace River region will be served by a network of gathering and transmission lines culminating in Westcoast Transmission Co.'s pipeline to the Pacific Northwest. Fig. 1.

Pacific Petroleums, Ltd., opens Peace River with . . .

5 Trillion Cubic Feet of Gas Ready for Westcoast

By Charles R. Hetherington

THE completion of the Westcoast Transmission Co. pipeline late this summer will mark the beginning of the long-sought natural-gas operations of Pacific Petroleums Ltd. Pacific, piloted by George L. McMahon, president, and Frank M. McMahon, board chairman, was the principal sponsor of the Westcoast pipeline project and will be the principal supplier of its natural-gas requirements. The first flow of gas from the Peace River area of Alberta and British Columbia to Vancouver and into the United States Pacific Northwest will be the realization of years of efforts by the company to explore the north country for natural gas and to develop practical methods for its production.

Gas was the goal . . . With the goal of a gas pipeline to British Columbia and the Pacific Northwest states always before them, the brothers McMahon pointed Pacific Petroleums toward a search for natural-gas reserves in the vast quantities required to support a big-inch pipeline. In the Edmonton area the Viking sand of the vast Viking-Kinsella gas field, stretched over 150,000 acres and had supplied most of the gas for Alberta since 1914. The McMahons saw the possibility of a similar vast blanket gas sand in the Peace River area of northwestern Alberta and set out to acquire all the acreage they could.

Imperial Oil Ltd. had drilled a well near a place called Pouce Coupe in this Peace River country near the British Columbia border, it struck gas, blew out, and burned spectacularly. The gas came from the so-called Cadotte sand, stratigraphic equivalent of the Viking.

At that time the Government of British Columbia, which owns the mineral rights in the area, had no legislation permitting leasing for private exploration. It planned instead to undertake development of the oil and gas lands itself. Years of negotiation by the McMahons and the drilling of some very expensive dry holes by the provincial government finally led to the conclusion that private enterprise could do the job better, and in 1947 legislation was enacted permitting the exploration and development of British Columbia acreage. Pacific Petroleums took out British Columbia Government prospecting permits Nos. 1, 2, and 3 in the 30-million-acre sedimentary triangle in the northeastern corner of the province. It is interesting to note that Phillips Petroleum Co., later to become an associate of Pacific in its manufacturing and marketing operations, also saw the prospects for the area and took out the next government prospecting permits that were issued. As additional acreage became available Pacific Petroleums continued to make acquisitions in the area.

With several millions of acres under permit in the vicinity of the first Imperial discovery, Pacific set out to prove up what it hoped would be a second vast Viking-Kinsella field. That hope, however, did not materialize; what did occur far exceeded the orig-

Author is vice president, production and manufacturing, Pacific Petroleums Ltd., Calgary, Alta.

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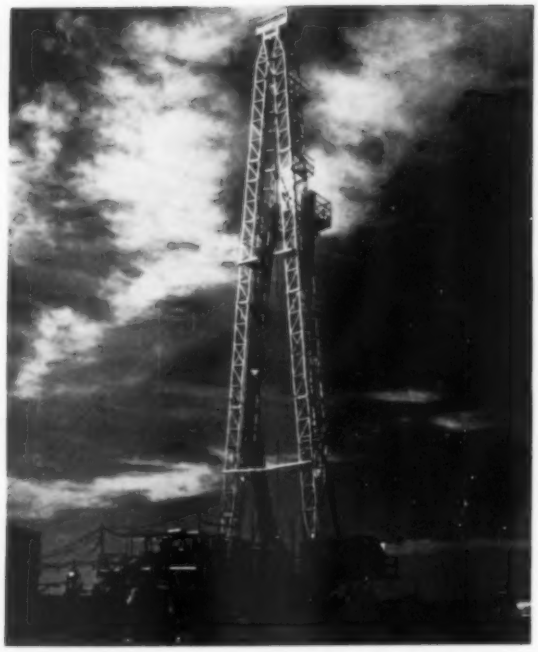
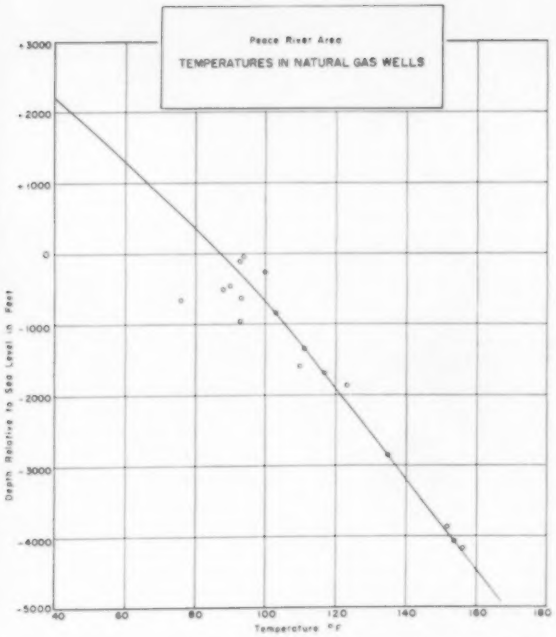


THIS MODERN DRILLING RIG is typical of those used in the Peace River country, where one wildcat out of two is a hit. Fig. 2.



GEOTHERMAL GRADIENT in Peace River natural gas wells. Fig. 3.

CANADA—Oil and Gas Unlimited!

inal expectation, but in a very different fashion.

The search for structure . . . Several hundred billion cubic feet of reserves were developed around the old Imperial well in what is now called Pouce Coupe field. But instead of a large blanket stratigraphic accumulation, the gas had accumulated on structural highs in the producing zones. The seismograph was immediately put to work and abundant structural anomalies were found throughout the area in a general east-west or northwest-southeast trend. One of the best indications of structural anomaly was found by surface geology in the Fort St. John area of British Columbia, where seismograph shooting in old lake-bed surface deposits had been inconclusive.

In 1952, Pacific Petroleums drilled this structure and discovered the first gas and oil in British Columbia in what is now Fort St. John field. The discovery well turned out to be an edge well but produced gas from three different zones and gas and oil in a fourth zone. This accumulation in multiple zones on a large subsurface structure and the existence of other large subsurface structures in the area was all the assurance needed for Pacific Petroleums to dedicate all of its resources to achieve the desired end—a gas pipeline through British Columbia to the Pacific Northwest states.

Five trillion cubic feet already found . . . Other companies moved into Peace River following this initial discovery, and today practically every major oil and gas company operating on the North American Continent is represented there. With the exception of Pacific Petroleums, these operators were primarily drilling for oil, but as a consequence of their search, gas discoveries followed rapidly. Shell Oil Co., Mobil Oil of Canada, Ltd., Texaco Exploration Co., and Gulf Oil Corp. found gas farther along the Alaska Highway in B.C. to the north, and Continental Oil Co., and Union Oil Co. of California, Shell and British American Oil Co., Ltd. found more to the southeast in Alberta. Imperial Oil had successes in both provinces, and more recently, Phillips and El Paso Natural Gas Co. have made new strikes. Proved gas reserves in the area now total over 5 trillion cubic feet of pipeline gas, but this is only the start.

For all the exploration that has been done, only about one well for every 100,000 acres of land has been drilled to test the sedimentary basin within the Peace River area. When it is considered, for example, that Pacific Petroleums has made one discovery for every two wildcat wells drilled, it is clear that new gas reserves will be discovered far in excess of the present proved reserves.

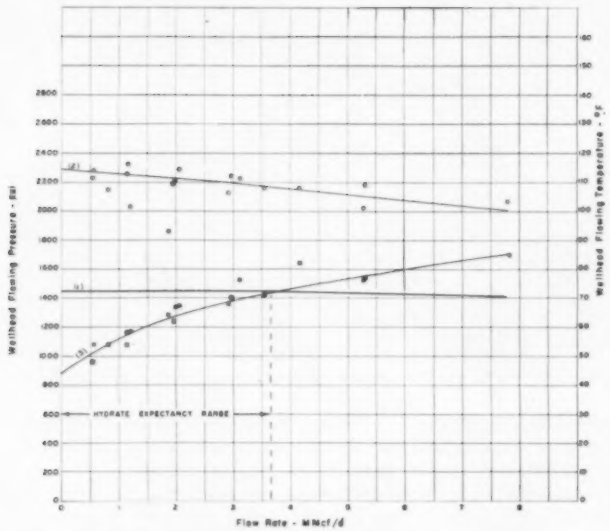
Gas and Reservoir Characteristics

The gases discovered and the reservoirs from which they are produced vary widely in characteristics. The gases range from dry and sweet to sour and wet, while the reservoirs range from sand through sandy limes to dolomites. Table 1 summarizes the general gas and reservoir characteristics for the principal producing zones in the area.

Reservoir lithology . . . The Lower Cretaceous sands are productive, principally on the Alberta side of the Peace River area, although the Cadomin sand is productive in the Fort St. John area and in Phillips Kobes Creek field, some 50 miles farther to the north. The accumulations of gas in the Cadomin sand are unique in all cases in that the gas-water contact is inclined so that production tends to occur on the side of a structure rather than directly on top.

The Nikanassin sand is a thick sand ranging up to 150 ft. and is the principal producer in the Buick Creek area. The Triassic D sand is a massive sandstone ranging up to 70 ft. in thickness; it blankets the entire area and is usually productive of gas where it is found on structure.

The Triassic A and B dolomites also are blanket zones and are sepa-



WELLHEAD flowing pressure and temperature for a typical Permo-Penn well in Fort St. John field, and the range of hydrate expectancy at the wellhead. Fig. 4.

rated by 30 ft. of dense black shale. To the north and east of Fort St. John, these zones become truncated and disappear. The top of the A zone is a weathered unconformity and the porosity, apparently obtained by leaching of meteoric waters, is better than the porosity of the underlying B zone. Intermediate between the Triassic B dolomite and the Triassic D sand there exists a series of sands and a dolomite. These so-called C zone sands are productive of both oil and gas in the Fort St. John area and the so-called Boundary Lake dolomite is the oil reservoir in Boundary Lake field.

The Permo-Penn producing reservoir usually is a dolomite although the zone varies in places to include sandy dolomites and zones of sand. This reservoir is one of the principal reservoirs in Fort St. John field but it does not extend more than probably 30 miles north from that area. The Rundle limestone of Mississippian age is the principal producing zone in Blueberry field and extends over the whole of the area.

While the Devonian has not been tested to any great extent because of depths exceeding 10,000 ft., a few tests have proved the D-1 to be highly productive. The D-1 is the principal reservoir in Parkland field, where it produces from 11,200 ft. The D-3 or Leduc reef exists in many parts of the Peace River and offers real prospects for production, although, with the exception of Sturgeon Lake oil field, no discoveries have as yet been made in this zone.

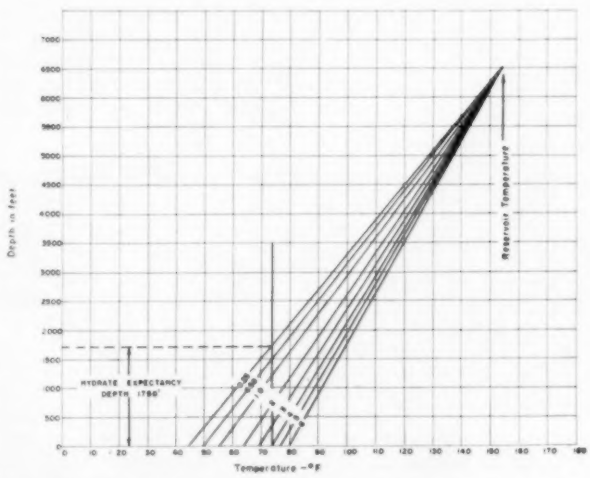
Completion Techniques

Just as the range of gas and reservoir characteristics varies widely, the range of completion techniques employed by Pacific Petroleums is equally varied. The Cadotte zone, principal reservoir in Pouce Coupe and South Pouce Coupe fields, is made up of four to five sand zones separated by dense shale breaks, with a separate gas-water contact in each zone. To make a proper completion the zone is drill-stem tested by 10-ft. intervals to determine accurately the gas-water contact, if any, within each of the separate zones. MicroLogs are run to determine the exact location of the dense shale breaks. Casing is set through the zone and cemented and accurately perforated opposite the top of each gas zone. With this perforating procedure gas wells can be completed which are clean and free from water production. The Cadotte and Gething sands are good clean sands and produce wells that average 20 to 30 M.M.c.f.d. without further treatment other than a mild mud-acid wash.

Completions in the Cadomin sand involve plugging back above water or bottoming the hole in the zone above the water where the inclined gas-water contact is known from an adjacent well. It was not known at first whether successful completions could be accomplished in this zone where bottom water exists at all locations; so in order to test the practicability of commercial completions, 31 Pacific Fort St. John was drilled and then tested over an extended period. The well was drilled as a twin, 75 ft. from a deeper neighboring well which had been drill-stem tested in the Cadomin zone to determine the gas-water contact.

The well was drilled about 10 ft. into the zone and bottomed 14 ft. above water. It was tested over an extended period of several weeks, flowing at rates up to 16 M.M.c.f.d (about 50 per cent of the absolute open flow) with sand face pressure drawdowns of about 400 psi. Throughout the test clean gas was produced free of water. The Cadomin sand is sensitive to filtrate invasion from water base muds so that better wells are obtained by drilling in with oil base mud. Casing is cemented on top of the sand and the mud is changed to an oil-base type before drilling in.

In the other sand reservoirs casing is generally set and cemented through the producing zones, although in some cases the Triassic D is completed in



FLOWING temperature of a typical Permo-Penn well at various depths in the tubing. Fig. 5.

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open hole to permit nitroglycerin shooting should such treatment prove desirable.

The dolomites also are usually completed by cementing casing through the producing zone. The zones are perforated with four bullets and four jet charges per foot and a production packer is set immediately above the zone.

Hydrates

Fig. 3 shows the geothermal gradient existing in the area and it is to be noted that temperatures below the gas hydrate range of 60° to 70° F. exist as deep as 2,000 ft. below the surface. Fig. 4 shows the wellhead flowing pressure and temperature for a typical Permo-Penn well in the Fort St. John area, along with the range of hydrate expectancy at the wellhead. Until a Permo-Penn well is produced at a flow rate in excess of about 3½ M.M.c.f.d. hydrates can be expected. Fig. 5 shows the flowing temperature of such a typical well at various depths in the tubing. For low flow rates, hydrates can be expected as deep as 1,750 ft. It has been found in production tests that hydrates have formed in the tubing as far as 2,000 ft. below the surface.

Other operators have employed hot-oil circulation through a dual string of tubing to maintain flow temperatures above the hydrate point; however, this system is costly to operate and maintain. Pacific's engineers developed a system for injecting glycol into the tubing immediately above the production packer which achieved the effect of preventing hydrate formation in the tubing. With flow rates as low as 0.5 M.M.c.f.d. recovery of glycol is obtained at the surface without undue slugging.

In all wells below the Cadomin zone, a dual string of tubing is set consisting of 2½-in. production tubing and ¾-in. macaroni tubing. Glycol is injected by a gas-driven reciprocating pump through the macaroni tubing where it enters the production tubing near the bottom of the hole through a spring-loaded side-door choke assembly. The injected glycol is entrained in the gas stream and is separated at the wellhead where it is regenerated in a standard glycol dehydration regeneration unit.

Where a battery of two to four wells has been drilled at the same location to different zones, the production from all wells is run to a common separator and the glycol is regenerated in a common regenerator. The separator segregates the three phases of gas, condensate and glycol-water, and the condensate which also has been dehydrated by contact with the glycol is put back into the dry gas stream for transportation along with the gas to a gas-scrubbing plant owned by Westcoast.

When the wells are brought up to a flow rate of 4 to 5 M.M.c.f.d. sufficient bottom-hole heat is carried with the gas to prevent hydrate formation and bottom-hole glycol injection is unnecessary. The injection equipment is valved so that the glycol can be injected directly upstream of the wellhead choke rather than into the bottom of the hole. Dehydration which results from this treatment reduces the dew point of the gas to about +10° F. at 1,000 psi., which is adequate for the operation of the gathering system. Tubing and wellhead corrosion is controlled by the addition of inhibitors to the circulating glycol.

TABLE 1

Reservoir, sand, and age—	Gas characteristics— % H_2S	G.P.M. of C_3+	Reservoir characteristics— Porosity, %	Permeability md.
Doe Creek, U. Cret.	Sweet	Nil	20-35	200-1,000
Cadotte, L. Cret.	Sweet	Nil	16-25	100- 500
Gething, L. Cret.	Sweet	0.2-0.9	18-25	500-1,500
Cadomin, L. Cret.	Nil-0.2	0.2-0.9	11-15	15- 100
Nikanassin, Jurassic	0.2-0.3	0.8-1.2	9-13	150- 300
C, Triassic	Sweet	0.2-0.9	11-15	200- 600
D, Triassic	2-18	2.0-4.0	9-14	15- 40
Dolomites—				
A, Triassic	4-5	0.7-1.0	9-17	50- 300
B, Triassic	4-5	0.7-1.0	6-11	25- 150
Boundary Lake, Triassic	Sweet	Oil	15-30	20- 80
Permo-Penn., Permo-Penn.	1-2	1.0-2.0	8-13	15- 250
Mississippian, Miss.	1.0-2.0	1.0-2.0	6-12	100- 400
D-1, Devonian	Sweet	0.2-0.5	10-20	fractured
D-3, Devonian	Sour	Oil	5-10	varied

Well Improvement Techniques

Pacific Petroleums has developed by trial and error a system of well-improvement techniques to increase productive capacity of its gas wells. All of the reservoirs below the Lower Cretaceous have been subjected to various well-improvement techniques and respond favorably to the proper treatment. As would be expected, the sands respond differently from the dolomites.

Nitroglycerin . . . The Triassic D sand is the most extensive sand reservoir and has been subjected to the largest number of well-improvement techniques. Natural flow from Triassic D wells is generally not large until well-improvement techniques are employed, after which production from these wells is as large as any in the area. Nitroglycerin was first tried on this zone in a well that had a small drill-stem test of 700 M.c.f.d and after various completion attempts, would produce only about 400 M.c.f.d. After shooting in an open hole with 440 qt. of nitroglycerin, the well was capable of producing a sustained flow of about 5 M.M.c.f.d. A second well, Pacific 30 Fort St. John, was also shot with 440 qt. of nitroglycerin with the result that the absolute open flow was increased from 8.6 to 32 M.M.c.f.d.

Fracturing . . . Since these tests with nitroglycerin, hydraulic-fracturing treatments have been used with equal success without the hazards involved in handling and using nitroglycerin. Both oil fracturing and water fracturing have been used. Fracturing with jellied oil produces equal or better results than jellied water and the oil is more easily handled in winter operations. In cases where a well produced a large natural flow on production test or had a large drill-stem test, water fracturing worked equally well as oil fracturing, but where the natural flow of a well was small, difficulty has been encountered in recovering the water after water-fracturing treatment. It is expected that these small wells will continue to recover fluid from the water fracturing for a period of time and that they will gradually clean up. Where these small wells have been treated with oil fracturing the oil has been recovered in the first few hours or days of production and the wells have cleaned up rapidly.

Fracturing treatment of the Triassic D sand has been done with 10,000 to 30,000 lb. of sand and an approximately equal volume of jellied diesel oil or water. Best results have been obtained by first establishing a feeding rate with straight jellied carrier followed by the addition of an increasing quantity of sand to maintain the wellhead injection pressure at the maximum rating of the wellhead equipment while at the same time making use of the full power of pumping equipment to obtain a maximum feed rate. By careful proportioning of the sand into the jellied carrier, a maximum feeding rate at minimum

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LARGE VOLUMES of natural gas byproducts will be produced from this plant at Taylor, B. C. Fig. 6.

feeding pressure can be obtained which produces the best results. On the average, such treatment has produced Triassic D wells with an absolute open-flow capacity after treatment equal to 8½ times the drill-stem test made at the time of drilling the well, or over 4 times the absolute open flow capacity before treatment.

The average D zone well after treatment has an absolute open flow capacity of about 30 M.M.c.f.d. The Nikanassin sand is generally much more permeable than the Triassic D sand and high-potential natural-flow wells can usually be obtained without treatment. Pacific Petroleums' experience in fracturing Nikanassin wells is limited, because West Buick Creek field, where this zone is the principal producer, has only recently been drilled for development wells. In these cases the well potentials have not been substantially increased on the average.

Acid . . . The dolomite zones have responded well to high-pressure acid treatment. Oil fracturing and water fracturing treatments have been tried with little results and acid fracturing treatments with sand carried by jellied acid has been generally unsatisfactory because of the continued production of sand after the treatment. Various combinations of acid treatments have been applied and the most effective treatment for the Triassic A and B dolomites consists of a combination of a small mud-acid wash (250 to 500 gal.) followed by 3,000 to 5,000 gal. of jellied acid, in turn followed by 5,000 to 10,000 gal. of channel, etching, and intensified acid. Best results are obtained with the highest injection pressures for which the wellhead equipment is suitable. On the average, such treatment has produced Triassic A and B wells with an absolute open-flow capacity after treatment equal to 8 times the drill-stem test made at the time of drilling the well or about 6.5 times the absolute open-flow capacity before treatment. The average Triassic A-B well has an absolute open-flow capacity of about 15 M.M.c.f.d.

VIEW of interior work at the Taylor, B. C., plant. Fig. 7.

The Permo-Penn wells respond well to pressure acid treatments. Various combinations of acids have been applied with approximately equal success. Generally a well is treated with 2 to 10 thousand gallons of acid using the highest injection pressure for which the wellhead equipment is suitable. The Permo-Penn zone reacts to acid readily and it is important to have pumping equipment with suitable power and capacity to give feed rates that will build up the pressures sufficient to fracture the reservoir. The results of treatment on Pacific 12 Fort St. John give a good example of this requirement for high-pressure acidizing. The well was acidized with 1,000, 2,000, 4,000, and 6,000 gal. of acid with inadequate pumping equipment that could not deliver sufficient volume to build up high-injection pressures. The open-flow capacity after this treatment was increased to about 9 M.M.c.f.d. from an original drill-stem test of 6.37 M.M.c.f.d. Subsequently, the well was acidized with 10,000 gal. injected at a rate sufficient to create pressures high enough to fracture the zone and, after this latter treatment, the open flow capacity was increased to 27.5 M.M.c.f.d.

Since the flow of Permo-Penn wells is usually quite high on drill-stem tests, in order of 6 to 18 M.M.c.f.d., the average increase in absolute open-flow potential has been only about three times the drill-stem test made at the time of drilling the well. The average Permo-Penn well has an absolute open flow capacity after treatment of about 30 M.M.c.f.d.

Only limited experience is available on Mississippian and Devonian wells and those experiences have been similar to that obtained on treating the other dolomite zones.

Pacific Petroleums has pioneered the use of well-improvement techniques in the area and will benefit substantially from increased open-flow capacity that has been obtained from the wells drilled to date. As a result of these improvement techniques it is estimated that the natural open flow of all wells drilled by Pacific has been increased by about fourfold. The development drilling program to provide deliverability for the initial capacity of the Westcoast pipeline is complete, and additional stepout wells are now being drilled in an effort to expand presently known gas reserves.

Byproduct Processing and Manufacturing

Gas plant . . . As a consequence of natural-gas production for the Westcoast pipeline, large volumes of natural gas byproducts will be produced and Pacific Petroleums has embarked on a project to refine these into merchantable fuels. The wet sour gas produced in British Columbia will be gathered in a sour-gas gathering system to a plant site at Taylor, B. C.,

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where it will be processed in a gas-scrubbing plant being constructed by Westcoast. Pacific has arranged for the purchase of all of the natural-gas liquids extracted from the Westcoast gas-scrubbing plant.

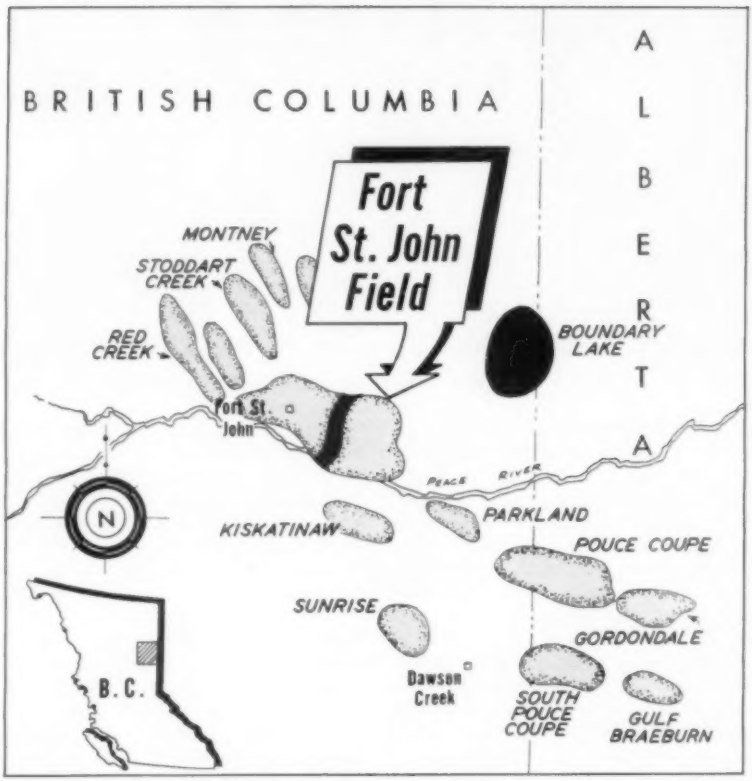
Refineries . . . Along with Phillips Petroleum Co., Pacific is building a refining plant at an adjacent site. The refining plant includes fractionating equipment, a catalytic desulfurizer and a U.O.P. catalytic reformer to produce specification grades of L.P.G., motor gasoline and diesel fuel. When processing the liquids recovered from expected initial gas volume of 200 M.M.c.f.d., the plant will produce some 500 bbl. per day of propane, 800 bbl. of butane, and 2,500 bbl. of gasoline and diesel fuels. The plant is being designed initially so that it can be expanded at minimum cost to handle the natural-gas liquids recovered from the processing of 400 M.M.c.f.d. of natural gas.

Markets . . . The best market for the petroleum products to be produced exists locally in the area. Production from the Dawson Creek refinery is presently being handled through a chain of bulk and retail outlets operated by Pacific Petroleums and owned jointly by Pacific and Phillips.

The two companies have entered into an arrangement whereby Pacific is the authorized manufacturer of and dealer in Phillips "66" products in Canada and will market the production from the Dawson Creek refinery and the Taylor, B. C., plant under the Phillips "66" trademark.

Conclusion

While Westcoast Transmission Co. has pioneered in the gas-pipelining field to provide an outlet for Peace River area gas, Pacific Petroleums has correspondingly pioneered in the discovery, exploration, and development of the gas supplies for the pipeline. While the gas-reserve picture, as finally established, has not turned out as originally visualized by the McMahons when they started the development of the area, the reserves nevertheless have been developed, available for Westcoast. Only the surface has been scratched to date. Pacific Petroleums looks forward with high expectation to the discovery and development of further gas reserves in the Peace River area and in the other areas that will serve as a source of supply for the Westcoast Transmission pipeline.



FORT ST. JOHN FIELD dominates the cluster of oil and gas fields discovered in the Peace River area of northeastern British Columbia. Fig. 1.

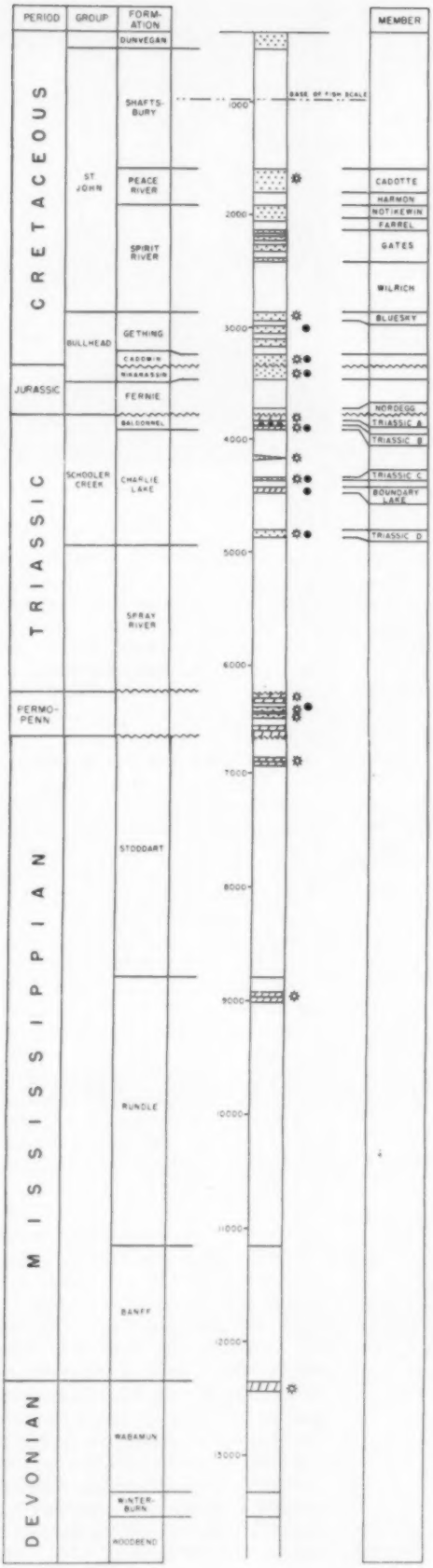
Fort St. John Sets Pace for Peace River Gas Fields

By L. M. Clark

THE Peace River district occupies the northwestern part of Alberta and that part of northeastern British Columbia east of the Rocky Mountains. The area is mostly tributary to the Peace River but in northeastern British Columbia extends northward into the Fort Nelson River drainage. It is largely rolling and wooded but in the vicinity of the Peace River contains a large amount of flat farm land. It has an area of about 58,000 sq. miles.

Since 1951, when Pacific Petroleums, Ltd., undertook aggressive wildcatting and exploration work, many important gas fields have been discovered, particularly in British Columbia. Fort St. John gas field, largest in the area, was found early in 1952 and this discovery has been followed by numerous other gas fields and several oil fields.

The Peace River district has the thickest sedimentary section of any that has been penetrated by the drill in the entire western Canada sedimentary basin. In addition to Rocky Mountain Laramide folding and faulting, Pacific's geological work and drilling disclosed anticlinal folding and faulting unrelated to or only slightly influenced by the Rocky Mountain faulting. The drilling also proved this area contains many productive reservoirs which are either not present or have not been found productive in other parts of the western Canada basin. As of this date, 19 zones, ranging in age from Middle Ordovician to Upper Cretaceous, have proved productive of gas or oil in the Peace River area. In British Columbia the gases are mostly sulfurous and contain large amounts of natural-



THE sedimentary section at Fort St. John field has been penetrated well into the Upper Devonian to 14,000 ft. This stratigraphic section displays the multiplicity of pay horizons found so far. Fig. 2.

gas liquids, whereas in the Alberta part most of the gas is dry and sweet. Oil has been found in several zones in various fields but to date the majority of the fields yield gas only.

Sturgeon Lake field in the southeastern part of the district is the most important oil field developed so far. This is an Upper Devonian reef field. However, the new Boundary Lake field in British Columbia, near the Alberta boundary, promises to be an important oil field if not a major one. It produces from a dolomite reservoir of Triassic age. In addition several other oil discoveries have been made within the past 6 months. Development drilling may prove some of these to be important oil fields.

The ratio of discoveries to total wildcats drilled to date in the British Columbia part of the Peace River district has been 1 to 2. This amazing record has encouraged a number of companies to enter the Peace River play, especially since an outlet for the gas was assured by the commencement of Westcoast Transmission's 30-in. pipeline to Vancouver and the Pacific Northwest and the discovery of important oil deposits. However, Pacific and its associates have so far drilled more than half the wells in the British Columbia part of the Peace River district.

Geology of Fort St. John Gas Field

Fort St. John gas field, largest of some 25 gas fields in northeastern British Columbia, is located along the Alaska Highway just north of the Peace River (Fig. 1). It lies about 50 miles east of the foothills belt of the Rocky Mountains. The field has seven gas zones and one

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thin lensing sand that yields light oil. It, together with closely associated fields, has estimated proved gas reserves on the order of 1 trillion cubic feet.

Thickest section in Canada . . . The sedimentary section, the thickest that has been penetrated by the drill anywhere in western Canada, totals more than 14,000 ft. in thickness. The productive rocks range from Mississippian to Lower Cretaceous. At least three angular erosional unconformities are recognized in the stratigraphic sequence. The field is located on a west-northwest trending anticline that has been proved productive for 20 miles of its length, with several culminations along the axis. The folding, which was initiated in Paleozoic time, has been recurrent—the latest folding involving Upper Cretaceous, the youngest strata in the area.

Geology found it . . . Pacific Petroleums, Ltd., the operator, discovered Fort St. John field by a combination of surface-geology mapping and use of the subsurface information furnished by two unsuccessful wells drilled on a surface structural nose that trends at near right angles to the deep subsurface trend. Although the seismograph has been instrumental in locating most of the other gas fields in the Peace River area, it had no part in the discovery of this first important British Columbia field, where thick clay deposits of a postglacial lake have nullified all seimic efforts.

Stratigraphy

The sedimentary section in Fort St. John field has been penetrated well into the Upper Devonian to a depth of 14,000 ft. The three angular un-

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conformities that have been clearly demonstrated are at the base of the Cretaceous, the Jurassic, and the Triassic respectively. These angular discordances are measurable in feet per mile rather than in degrees. Nevertheless, they are distinct and clear cut as shown by regional truncation and overlap as well as by the details of the contacts disclosed in diamond cores. The stratigraphic section thins to the northeast by truncation as well as by sedimentation.

Glacial drift and postglacial lake deposits cover most of the area to varying depths.

Upper Cretaceous . . . Brackish water sands and marine shales of Upper Cretaceous age occupy the surface except where recent or preglacial erosion has removed them. The thickness here is about 600 ft.

Lower Cretaceous . . . The Lower Cretaceous which is here 2,700 ft. thick, consists of 2,200 ft. of shales and silty sandstones of marine origin underlain by 500 ft. of nonmarine shales, sands, coal, and conglomeratic sandstones. The unconformity at the base of the Cretaceous represents an hiatus that correlates with important mountain building to the west of the Rocky Mountains.

The youngest commercial gas zone in Fort St. John field occurs in the Cretaceous basal conglomerate.

Jurassic . . . The Jurassic consists of three distinct formations totaling 500 ft. in thickness. The upper formation, the Nikanassin, is a 150-ft. quartzose sandstone which has not been found to be productive to date in this field probably because it is directly overlain by porous Lower Cretaceous conglomerate.

The Nikanassin is underlain by the 280-ft. Fernie clay shale. This is underlain by the 70-ft. Nordegg black dense bituminous shale which lies with distinct erosional unconformity on the Triassic.

Triassic . . . The Triassic which is here 2,500 ft. thick includes three major lithological divisions; the upper dolomite about 125 ft. thick, the middle anhydritic red bed formation 1,000 ft. thick, and a lower silty shale 1,400 ft. thick.

The 125-ft. dolomite at the top of the Triassic is highly fossiliferous, somewhat cherty and has a rotten leached appearance probably due to the action of ground waters during the period it was exposed to erosion. It consists of two porous gas-bearing members separated by 30 ft. of highly argillaceous, dense dolomite. This Upper Triassic carbonate formation is referred to as the Baldonnel formation.

Underlying the Baldonnel with apparent conformity is the 1,000-ft. red bed section consisting of anhydrite, siltstone, dolomite and sandstone to which the name Charlie Lake formation has been applied. This contains several thin stray porous sandstone and dolomite zones as well as a blanket sandstone near the base. One thin stray sandstone near the middle of the Charlie Lake formation and referred to as the Trassic C zone develops porosity in the eastern part of Fort St. John field and four oil wells there produce 39°-gravity oil from this sand.

At or near the base of the Charlie Lake formation occurs one of the most productive zones in the Peace River area. This is a 50-ft. fine-grained sandstone referred to as the Triassic D zone and yields very large gas wells.

Permo-Pennsylvanian . . . The Permo-Pennsylvanian here consists of fine-grained crystalline dolomite, dolomitic sands, and cherty dolomite. The dolomite members constitute one of the important gas reservoirs of this field. In addition one small oil well has been completed in a stray zone.

Mississippian . . . The greatest known thickness of Mississippian strata in the western Canada sedimentary basin occurs in Fort St. John field. Only one thin porous zone was encountered in the Mississippian in the one well in the field that penetrated it entirely. This contains gas. The Mississippian consists of three distinct units — an upper, referred to as Stoddart or upper Rundle formation which is here 2,160 ft. thick, a middle limestone, the Rundle, 2,350 ft. thick, and the Banff shale 1,400 ft. thick.

Devonian . . . The Upper Devonian has been penetrated to a thickness of 1,400 ft. in Fort St. John field. The Wabamun formation is recognized as well as the Winterburn. However, the Woodbend consists largely of quartzitic sandstone at this place. Gas was found in the Wabamun dolomite but appeared to be coming from fractures as no appreciable porosity was encountered in the one well drilled to it in Fort St. John.

Structure

The general Fort St. John area differs structurally from the rest of the plains portion of the western Canada sedimentary basin in that it has been folded into anticlines and synclines. This important difference taken together with the thicker section and hence more abundant reservoirs, accounts for the high discovery ratio of approximately 1 out of 2 wildcats drilled.

GAS FLARE beside a drilling rig in Fort St. John field. Fig. 3.

Fort St. John field lies between the Rocky Mountains and the deeply buried Peace River granite arch. Folding associated with normal faulting was initiated at least as early as Mississippian time and the folding has been recurrent. This early folding and faulting established structural trends quite divergent to the much later Rocky Mountain trends.

The post-Cretaceous disturbance that created the Rocky Mountains established folds and faults paralleling the mountain trend. In the British Columbia part of the Peace River area, these mountain-building forces produced anticlines far east of the highly faulted foothills belt. As the foothills are approached this Rocky Mountain or Laramide folding appears to have largely overwhelmed the earlier folding and obliterated the earlier trends.

Fort St. John gas field is located on an anticline that was formed during the earlier period of folding and has a near east-west trend. This fold was altered by the Laramide forces but the main trend was not destroyed.

The Fort St. John anticline has closure on the order of 150 ft. and has been proved productive for about 20 miles of its length. At the western end of the productive part it appears to swing more northerly, possibly due to the influence of the Rocky Mountain faulting and folding. **End.**

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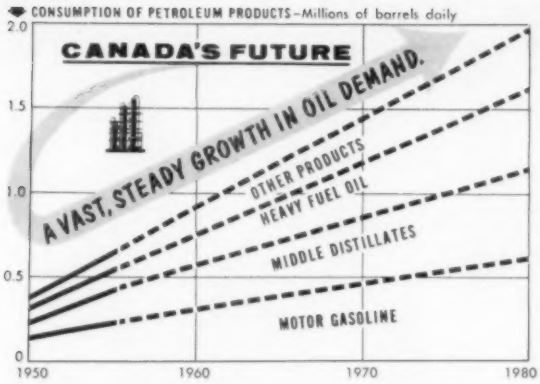

INCREASING demand for the next 20 to 25 years is the prediction for Canada. Fig. 1.

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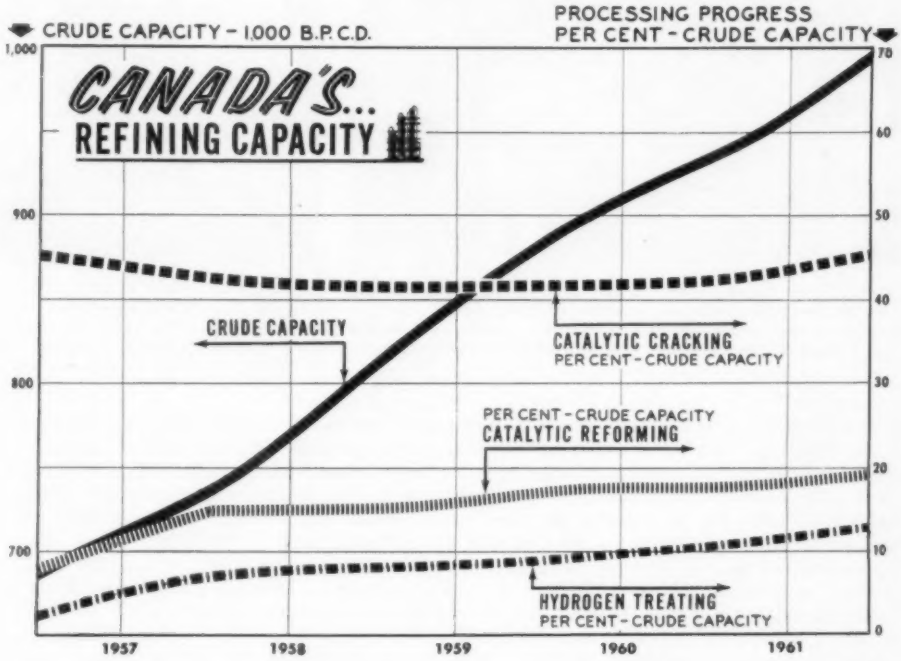
- Product demand to hit 275,000,000 bbl. this year, 12.5 per cent over 1956.
- High energy requirements bolster future markets.
- Newcomers promise brisk competition.
- Natural gas to the East—a new fuel competitor.
- 100-octane superpremium gasoline is coming—Will it kick off an octane race?



CRUDE capacity is expected to hit 1 milion barrels daily sometime in 1961, following a steady rise from the current 700,000-bbl. figure. Fig. 2.

Canadian Refining Has Growing Pains

. . . but it's taking them in stride as growth marches on

By George Weber
Refining Editor

THE refining business in Canada is as sound as a Canadian dollar.

The industry today is working against a steadily rising backlog of future energy demand. Its prospect of a 10 per cent per annum rise in petroleum consumption over the next few years places Canada in the forefront of major nations. This year demand will jump about 12.5 per cent, to reach 753,000 bbl. per day.

Refiners today are pressed in some instances to maintain their position in these hard-money times. But regardless of their financing problems, they will have to share gallonage with newcomers. The burgeoning Canadian market already has drawn one new major oil company, Canadian Petrofina, Ltd., into the field.

Two more, Cities Service Oil Co., Ltd., and British Petroleum, Ltd., are now committed to enter Canada with new refineries. At the same time, established Canadian refiners are busy planning expansion of existing plants, and building entirely new refineries across the dominion.

Soft spots . . . There are some soft spots in gasoline markets. Price wars have broken out in isolated areas, principally in the east. The steady

IMPERIAL'S F.C.C. UNIT, located at Sarnia, Ont., symbolizes Canada's world leadership in catalytic cracking capacity, as percentage of basic crude capacity. Canadian refineries also have a high level of cat reforming and other processing for product quality.

CRUDE CAPACITY GOING UP—This new unit at British American Oil Co.'s Clarkson refinery will add 40,000 bbl. per day to crude capacity. The added increment will be supplied by pipeline from western Canada. Canadian basic crude capacity is rising at the rate of about 10 per cent per year.

growth demand will serve to absorb local oversupply in some of these areas. But in the regions served by Montreal, Toronto, and Sarnia refineries, the industry looks for a period of brisk competition.

Competition also is coming from another angle—natural gas. When Trans-Canada commences deliveries in the east, refiners anticipate some slowing in heating oil demand. Overall yields will be adjusted to favor more gasoline at the expense of middle distillates.

From the standpoint of octanes, Canadian refiners are in good shape. They not only maintain a comfortable margin on car requirements this year, they have further raised the octane pool of their marketed products roughly one research number over the past year. As regards their potential, Canadian refiners could in general, boost octanes another 1½ R.O.N. over the going average with their present processing equipment. How much of a rise in actual octane number of marketed motor fuel will be instituted over the next year depends largely on the competitive situation in the oil industry itself.

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Third-grade premium . . . Third-grade superpremium gasoline has not yet invaded the Canadian market. But it is conceded to be coming, probably next year. When and if some company breaks loose with a 100-plus supergrade, the same spurt in the over-all octane picture that has taken place in the United States could well result.

This year sees Canada moving ahead in its bid for net self-sufficiency in petroleum. Imports are still rising. But consumption of domestic crude and exports to the United States are building up at a faster pace. Total crude imports this year are expected to fall to about 20 per cent of domestic crude production including exports to the United States.

Canada's Future Markets

The extended forecast of Canadian petroleum requirements has received much attention during the past 18 months. But the estimates on future energy requirements from petroleum as presented before the Royal Commission on Canada's economic prospects, already are being revised upward.

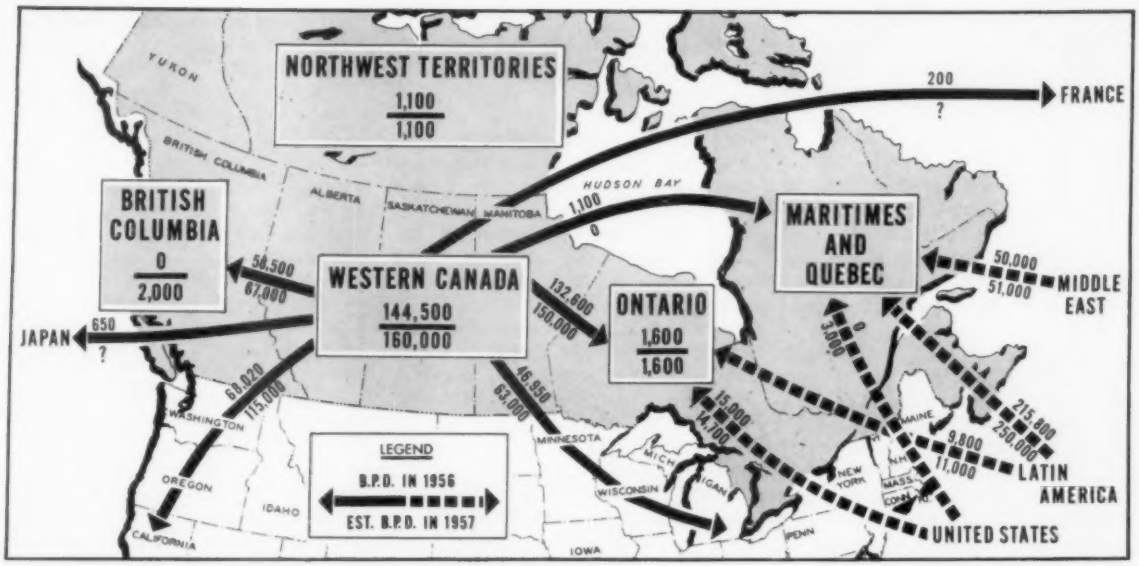
The curves predicting Canadian petroleum demand at 1¾ million barrels per day by 1980 are now considered out of date. A consensus of estimates now places consumption of all petroleum products at about 915,000 bbl. per day by 1960, and 2,000,000 bbl. per day by 1980.

Fig. 1 outlines the thinking today on Canada's future growth. By 1980, demand for motor fuel, burning oils, diesel fuel, industrial fuel oil, and other products will practically treble last year's consumption.

Changes . . . Not all classes of petroleum products will show the same growth curve however. The invasion of eastern markets by western natural gas will bring about some changes. Today, the yield of heavy whites, or middle distillates almost equals that of gasoline in eastern Canadian refineries. With the advent of natural gas, home heating will swing to this new fuel.

The ratio of gasoline to heating oil will then be expected to approach the 1.5 to 1 ratio which exists in the prairie provinces where natural gas is available today. The same trend away from middle distillates will hold for British Columbia.

But actual volume demand for middle distillates is not expected to diminish in Canada as a result of wider natural-gas distribution. Oil will continue to show gains as a source for home heating. The principal inroads to be expected from natural gas will be in the markets for coal, coke, wood, and other fuels. By 1960, demand for



CRUDE MOVEMENTS in Canada. Imports are shown as dashed lines. Exports and crude for internal consumption are shown as solid lines. Figures above the lines are in barrels per day for 1956; those below the lines are estimated barrels per day for 1957. For detailed information, see Tables 1 and 2. Fig. 3.

middle distillates should reach 290,000 bbl. per day. Consumption will top 500,000 bbl. per day by 1980.

Natural gas will greatly increase its share in industrial energy requirements. The year 1960 should show gain of nearly 40 per cent over 1955, and 1980 will require roughly a fourfold increase in natural-gas production for industrial needs. Again, natural gas will not make serious inroads in the industrial market for heavy fuel oil.

An increase of roughly 32 per cent is expected in heavy fuel demand between 1955 and 1960. By 1980, consumption of this petroleum fraction is expected to rise to nearly threefold its 1955 level of 120,000 bbl. per day.

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Expansion Continues

How well Canadian refiners are keeping up with this burgeoning demand for petroleum products, is apparent from the list of building projects now under way or planned. A total of four complete new refineries are now planned.

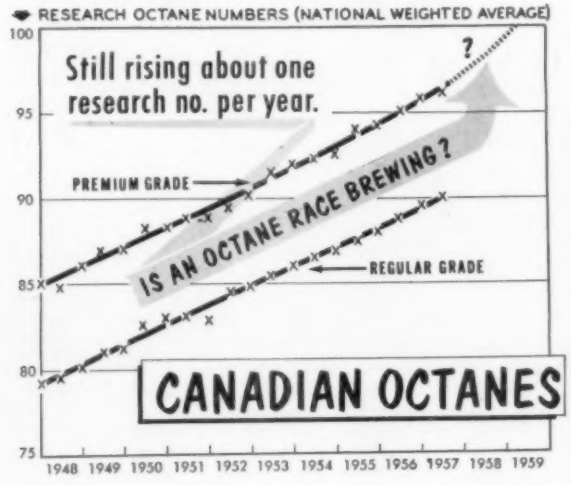
Company and location—	Capacity, bbl. per day	Est. comp. date
British American Oil Co., Ltd., Vancouver	20,000	1958
Cities Service Oil Co., Ltd., Toronto	20,000	1958
British Petroleum Canada, Ltd., Montreal	30,000	1961
Shell Oil Co. of Canada, Ltd., Toronto	20,000	1961

In addition, several projects now under way or planned will add still more to basic crude capacity. British American is nearing completion on facilities at Clarkson, near Toronto, which will add 40,000 bbl. per day to crude capacity. Canadian Oil Cos., Ltd., will boost the Corunna refinery near Sarnia, Ont., from its present 30,000 to 50,000 bbl. per day, probably within the next 2 years.

Canadian Petrofina, Ltd., has plans to expand its relatively new Montreal refinery to 30,000 bbl. per day, an increase of one-third its present capacity. Imperial Oil, Ltd., having recently rebuilt its plant near Halifax, will next turn attention to the prairie provinces, with a building program budgeted for Calgary.

Regent Refining (Canada), Ltd., now an affiliate of McColl-Frontenac Oil Co., Ltd., will more than double its present capacity with a 20,000-bbl. addition to crude capacity at Port Credit near Toronto.

The independent companies are not losing ground. Husky Oil & Refining, Ltd., is planning additions at Lloydminster, Alta.; Moose Jaw, Sask.;



OCTANES are rising steadily in Canada, and there seems to be no letup in sight. Fig. 4.

TABLE 1

EXPORT OF CANADIAN CRUDE OIL TO UNITED STATES
(Daily average, barrels)

Importing states—	1956	First 4 mos. 1957
California	15,050	38,380
Washington	52,970	77,860
Montana	360	210
North Dakota	2,690	.....
Minnesota-Wisconsin	42,080	57,930
Michigan	4,870	5,210
Miscellaneous	90	30
Total	118,110	179,620

and Fort William, Ont. A number of other incremental boosts to basic capacity are under way across the country, with other projects yet to be announced later this year.

Capacity for Quality

At the same time, Canadian refiners are boosting their potential for higher octane motor fuels and higher quality products across the board. The rapid increase in basic crude capacity requires even greater expenditures in order to raise the quality potential of products.

... **Catalytic reforming** shot up during the past 2 years, to match the high level built in the United States refining industry. The Canadian industry is maintaining its position, and estimates of building over the next 4 years indicate that cat reforming capacity will approach 20 per cent by 1962 (Fig. 2).

... **Hydrogen treating.** This bids to become the same all-around work horse in Canada that it is rapidly becoming in the United States. Projections on this type of processing capacity have regularly fallen short of actual installation, because of the rapid acceptance that hydrogen treating is receiving today.

It is conservatively estimated that by 1962, roughly 15 per cent of crude capacity will be represented by units treating reformer feed stocks, middle distillates, lubes, waxes, catalytic cycle stocks and feed stocks, and other refinery streams.

... **Catalytic cracking** on the other hand appears to be leveling off at about 45 per cent of total crude capacity. The rapid buildup of this type of processing over the past 4 years brought Canada up to the highest level of any major refining country. It appears that the industry will maintain this level, without any sizable increase for the next 4 years.

... **Alkylation for motor-fuel octanes** is not yet an important factor in Canada. But it is coming. Until Canadian Petrofina built its new Montreal refinery, there was only one alkylation unity in the country—a wartime unity at Imperial's Calgary plant. Now, Shell is adding new alkylation capacity at Montreal and British American plans to include such a unity in its new grass-roots British Columbia refinery. Others will follow, and the pace is expected to quicken.

Canadian refiners probably will need more alkylate to attain the same octane level than will United States refiners. The reason for this is the relatively greater factor represented by jet fuel in Canada's future. Commercial airlines are using the gasoline type, JP-4 fuel, rather than the kerosine which is finding acceptance in the United States.

This will have the effect of competing with catalytic reforming for feed stocks. Thus, for the same octane level, Canadian processors are expected to rely more heavily on alkylation than their United States counterparts.

Octanes Rise Steadily

Just what this increased octane potential will do to Canadian motor-fuel quality, remains to be seen. Average research ratings for the country have been rising steadily at about the same one number per year as in the United States (Fig. 4). This year appears to be no exception.

But watch 1958. Sun Oil Co. has introduced its interim second grade in Canada and is expected to follow through next spring with the same multigrade system announced for the United States. This would introduce a superpremium 100-plus grade to the Canadian market. The effect of high quality third-grade motor fuel in the United States has been to raise the octane ratings of premium in two-grade systems as a competitive measure.

If the same moves follow in Canada, octanes may well take a spurt in 1958. The potential for an accelerated rise is now present. Many refiners could today market a 100-R.O.N. premium grade of motor fuel. The competitive incentive to do so is one factor that cannot be forecast with accuracy. But Canadian octanes are expected to rise by pressure from within the oil industry, rather than from higher automotive compression ratios, over the next year or more. The entry of new companies into Canadian markets will accentuate this brisk competition for gallonage. So, look for 100-octane superpremium gasoline in Canada next year—and probably from more than one supplier.

Progress on Crude Balance

As long as domestic crude remains out of reach of the major Montreal refining center, Canada's crude imports are expected to continue their rise. The day when western crude moves to Montreal is not yet in sight.

But elsewhere in the country, the refining industry has reverted almost 100 per cent to domestic charge

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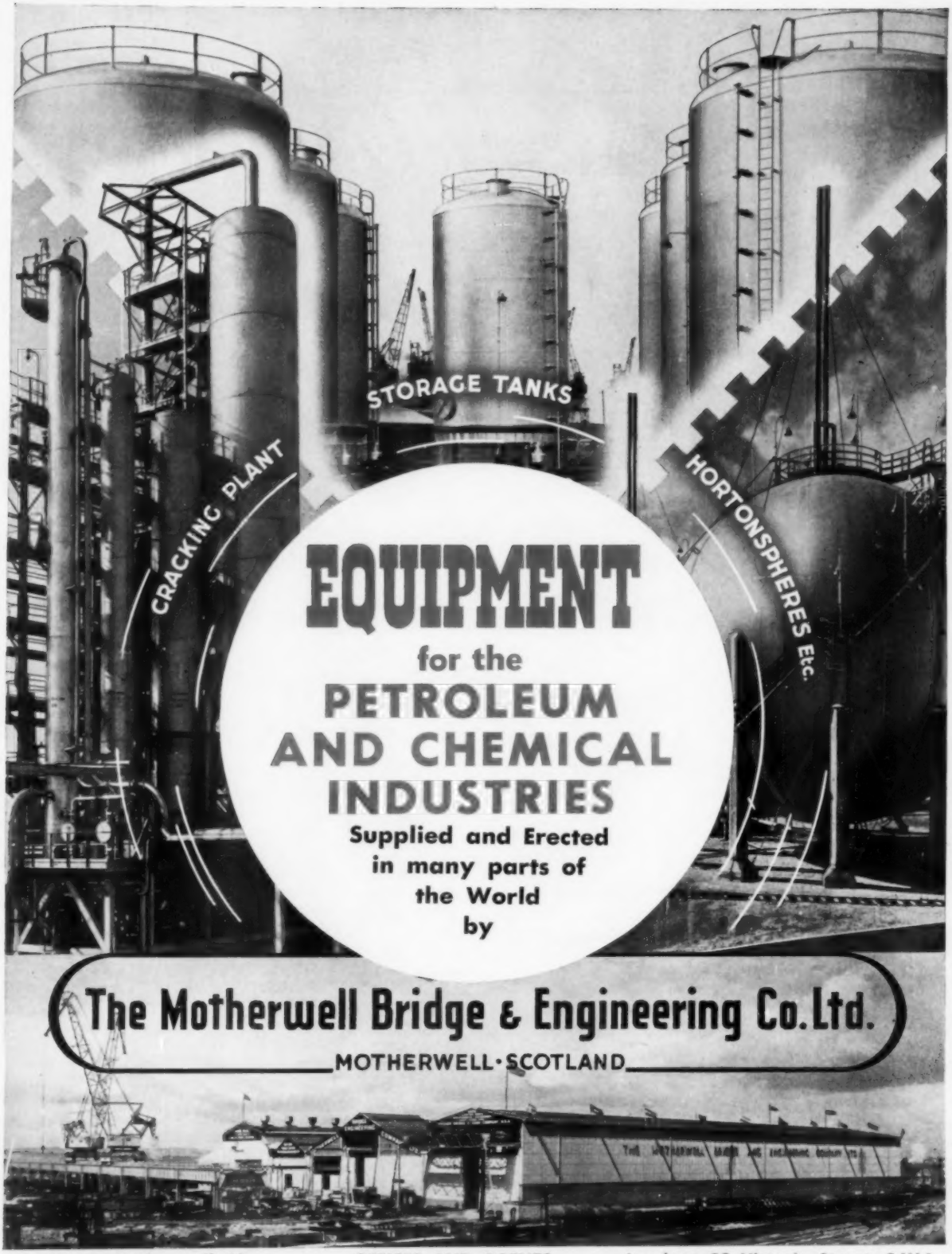
TABLE 2—CRUDE MOVEMENTS TO CANADIAN REFINERIES
(Average barrels per calendar day, 1956)

To— From—	Maritimes and Quebec	Ontario	Manitoba	Saskatchewan	Alberta, N.W.T.	British Columbia	Total Canada
Venezuela	211,800	4,100					215,900
Trinidad	3,400	5,700					9,100
Colombia	600						600
Total Latin America	215,800	9,800					225,600
Saudi Arabia	43,500						43,500
Kuwait	2,200						2,200
Iran-Iraq	4,300						4,300
Total Middle East	50,000						50,000
United States		15,000					15,000
Total imports	265,800	24,800					290,600
Ontario		1,600					1,600
Manitoba		1,100	12,800				13,900
Saskatchewan		7,900		15,000			22,900
Alberta and N.W.T.	1,100	123,600	14,800	37,400	65,600	58,500	301,000
Total domestic	1,100	134,200	27,600	52,400	65,600	58,500	339,400
Total all Canada	266,900	159,000	27,600	52,400	65,600	58,500	630,000



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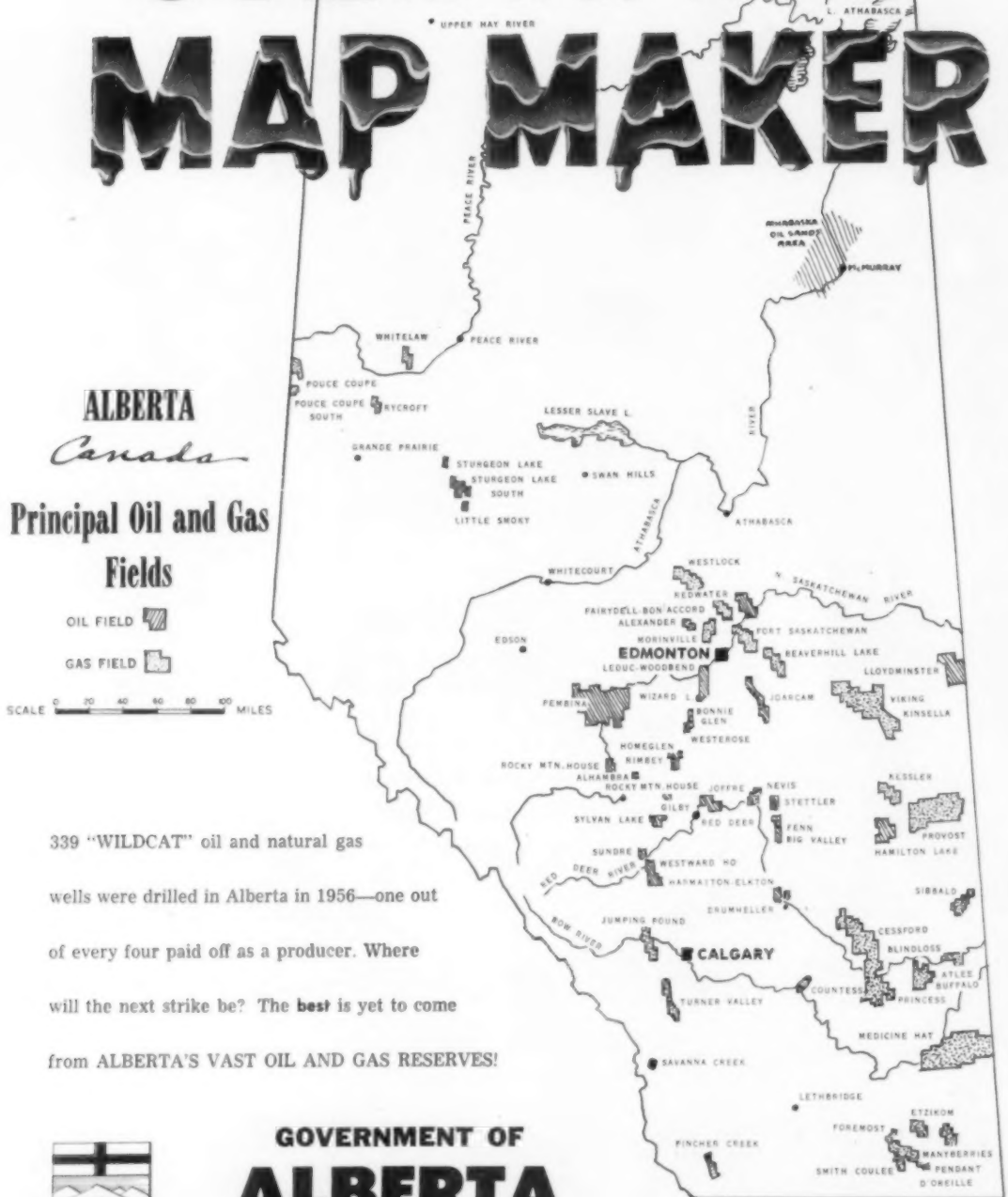

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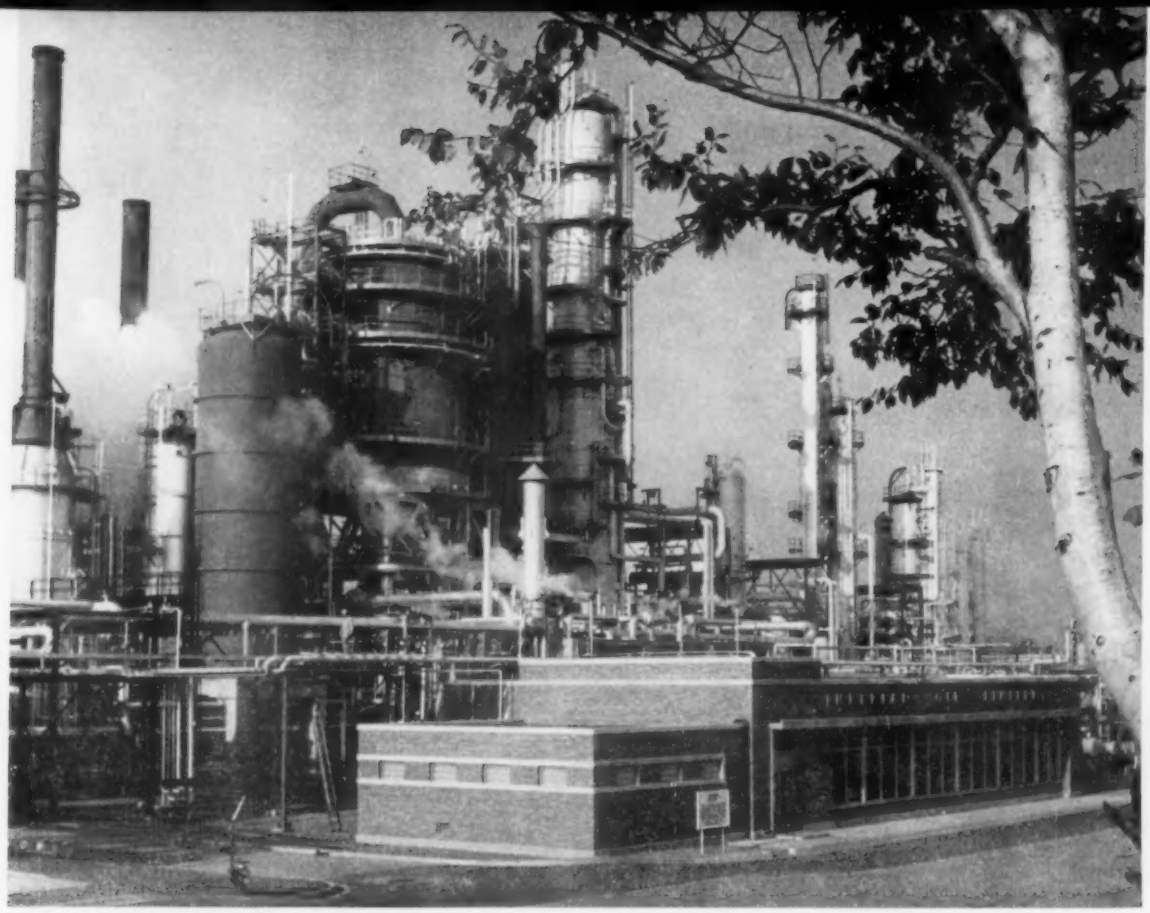

IMPERIAL'S HALIFAX PLANT is a typical result of the modern ization and expansion programs widespread in Canadian refineries. At a cost of $30,000,000, this, Canada's easternmost refinery, was converted from an 18,000-bbl. per day installation with thermal cracking and polymerization, to an ultramodern 42,000-bbl. per day refinery with fluid cat cracking, light-ends recovery, and other new facilities.

stocks. Fig. 3 depicts crude movements to Canadian refineries and exports of domestic crude. The actual volumes for 1956, in barrels per day, are shown above the line, with estimates for 1957, listed below the lines.

Some minor departures from normal have resulted from the Suez crisis. For example, minor amounts of Canadian and United States crude wound up in the Quebec-Maritimes area, and small shipments of domestic crude went to Japan and France.

Aside from these departures, the pattern of oil movement is normal. In Ontario, Regent continues to process Trinidad crude under a long term contract with its affiliate in the Caribbean. Sun Oil Co.'s Sarnia refinery still charges mostly Texas crude, but its announced program for converting to domestic charge stocks is now under way.

United States exports . . . The rapid rise in Canadian exports to the United States is helping Canada along the road to net self-sufficiency in petroleum. Last year, United States imports spurted to 118,110 bbl. per day, a 165 per cent increase over 1955. A further rise of better than 50 per cent is anticipated this year. However, United States import policies and other factors cloud any firm projection beyond this year.

The Pacific Northwest seems solidly in the Canadian oil orbit. Imports to Washington State averaged close to 78,000 bbl. per day during the first 4 months of 1957. Operating refineries in that area total 90,000 bbl. per calendar day in total capacity and at least 150,000 bbl. per calendar day additional is either under construction or planned.

California refineries upped their take of Canadian crude early this year. But the low current tanker rates have brought about a reduction in Canadian imports in favor of crude from the Far East and Middle East, to Los Angeles and San Francisco.

Great Lake area . . . The Minnesota-Wisconsin market looms as an important outlet for more Canadian crude. Refining capacity of 68,000 bbl. per calendar day in the two states is largely supplied from north of the border. But it falls far short of the market, which is met for the most part, from products pipelined from the Mid-Continent.

Combined with the growing needs for Ontario refineries, this projected gain in crude requirements for the Great Lakes area of the United States is now under intense study by Interprovincial Pipe Line Co. The indicated requirements of its customer companies spell more expansion by 1960 or 1961.

The first bottleneck is going to be the 175-mile stretch between the junction with Westspur Pipe Line Co. in southwestern Manitoba, and the takeoff to Winnipeg, through Winnipeg Pipe Line Co. Expansion of capacity there and further to the southeast along the Lakehead right-of-way will require an investment of $20 to $25 million. Beyond that, Interprovincial and its affiliates face the major project of boosting capacity from one end of the system to the other.

If demand in Ontario and midwestern United States continues to grow as expected, this complete new round of pipeline building will follow soon after the last increment is added in southern Manitoba.

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Will These Sedimentary Basins Prove Oil Bearing?

"It is probable that in any of the three basins (arrowed on map) oil will eventually be found, but only following a serious combined geological and geophysical program."

By W. B. Gallup

A PORTION of the West Coast of North America showing petroleum-producing basins in California and similar undeveloped features to the northwest. Arrows point to three basins discussed. Fig. 1.

THIS article is intended only as an introduction to three sedimentary basins lying off the northwest coast of North America. An attempt will be made to compare these basins to others along the West Coast of North America having similar tectonic and sedimentary histories, some of which are prolific producers of petroleum. These basins are shown on the map (Fig. 1) — the Georgia basin, the Hecate basin, and the Gulf of Alaska basin.

Throughout a great part of geological time there has been a major downwarp along the West Coast of this continent. This feature is identified by Kay as a euogogeosyncline and in keeping with his specifications has certain characteristics. It has been and still is a trough along the edge of the continent which has received great amounts of igneous rocks both of hypabyssal and volcanic origin, together with a very considerable thickness of sediments. It extends the entire length of the continent, north and south, its western boundary being the present edge of the Continental Shelf and its eastern boundary being about the site of the present Selkirks or the eastward limit of thick volcanics of Paleozoic and Mesozoic age. Further, it has been considerably consolidated by the great amounts of igneous material which have accumulated in it, leaving scattered residual basins. These residual basins within the major feature may be considered as somewhat confined since the beginning of the Cretaceous. Thus, sediments deposited in them during the Cretaceous and Tertiary are more apt to be clastics than those deposited in the broader pre-Mesozoic features. Ordovician sediments are the earliest identified; these were, for the most part, engulfed by Triassic and Jurassic igneous activity, this latter condition of course, applying for all rocks of the pre-Mesozoic age, the period of greatest activity being during the Triassic and Jurassic. In the Gulf of Alaska there is a considerable amount of late Tertiary volcanics.

Following these earlier eras, only the residual troughs remained and the unaltered sediments in them now were derived from the erosion of the ancestral Jurassic and later mountain ranges throughout the Cretaceous and on through the Tertiary to the present. These may still be identified today—the Gulf of California, the Salton Sea, the Los Angeles Basin, the Great Valley of California, the Willamet Valley, Puget Sound, the Georgia basin, the Hectate basin, and the coastal area of the Gulf of Alaska.

In some instances the Tertiary and

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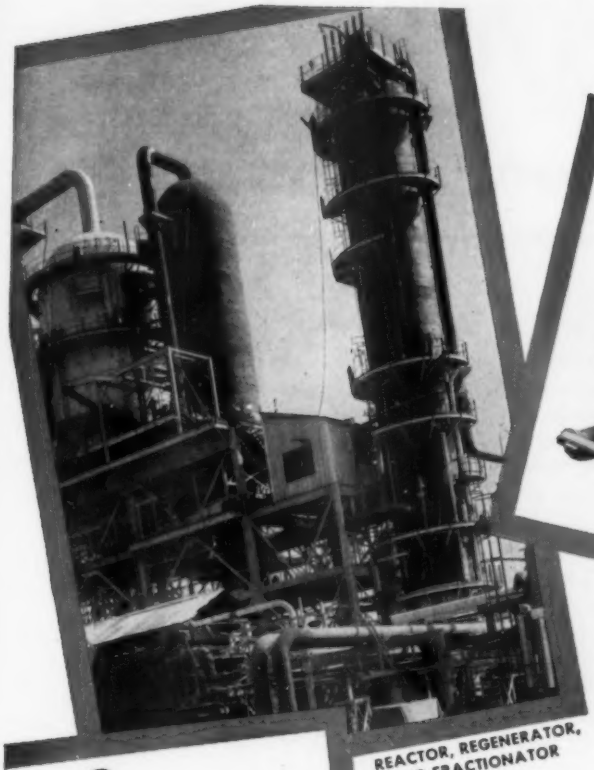

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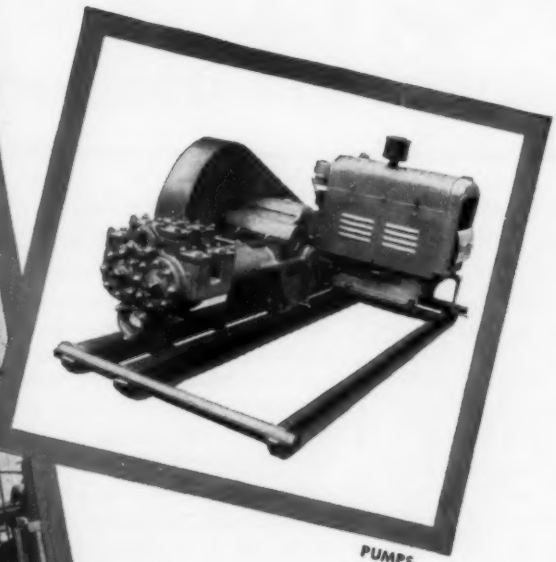

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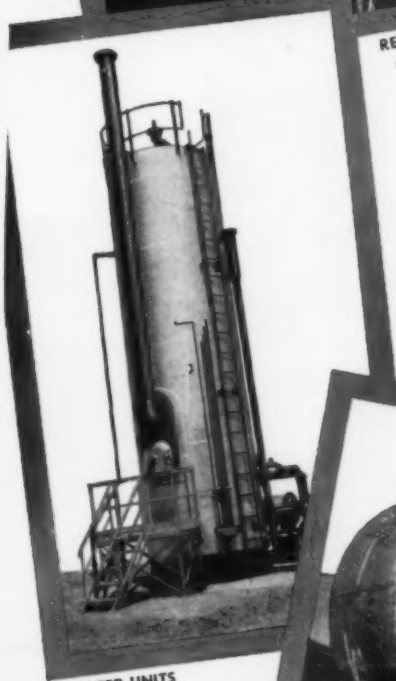

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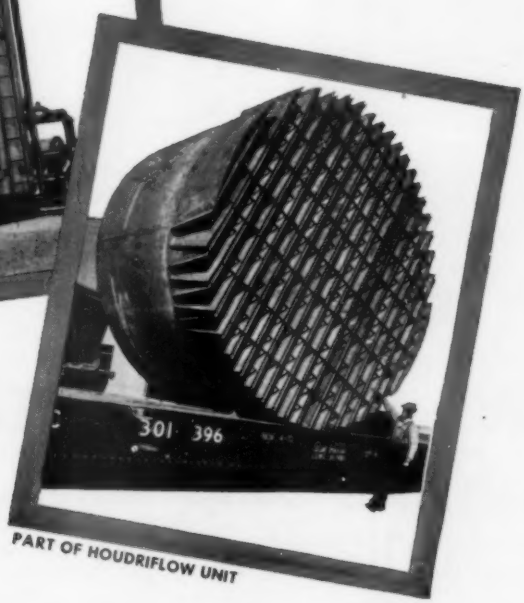

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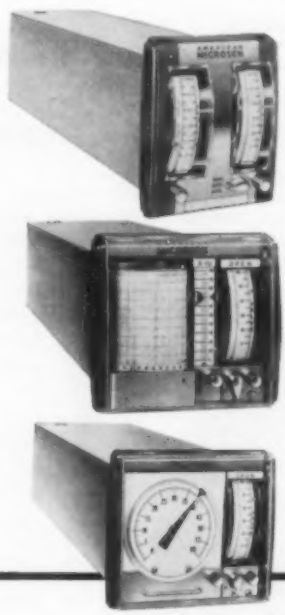

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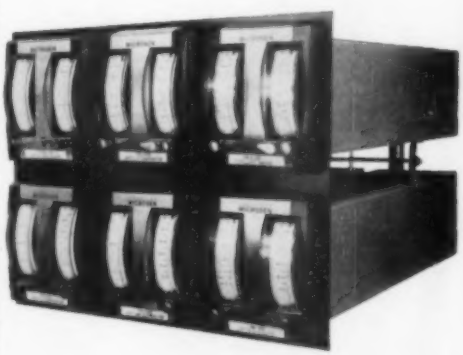

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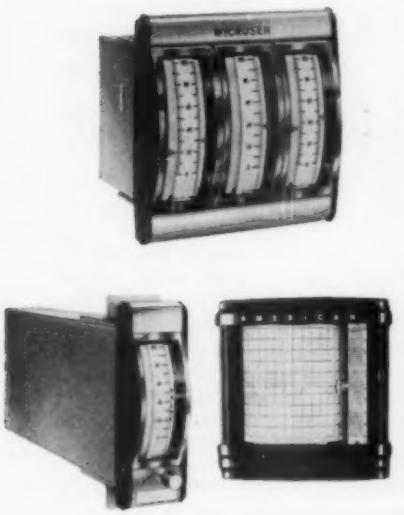

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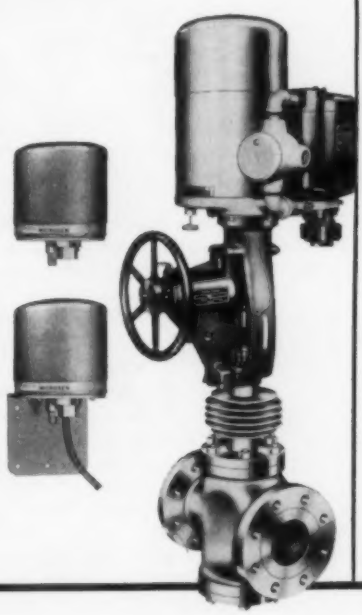

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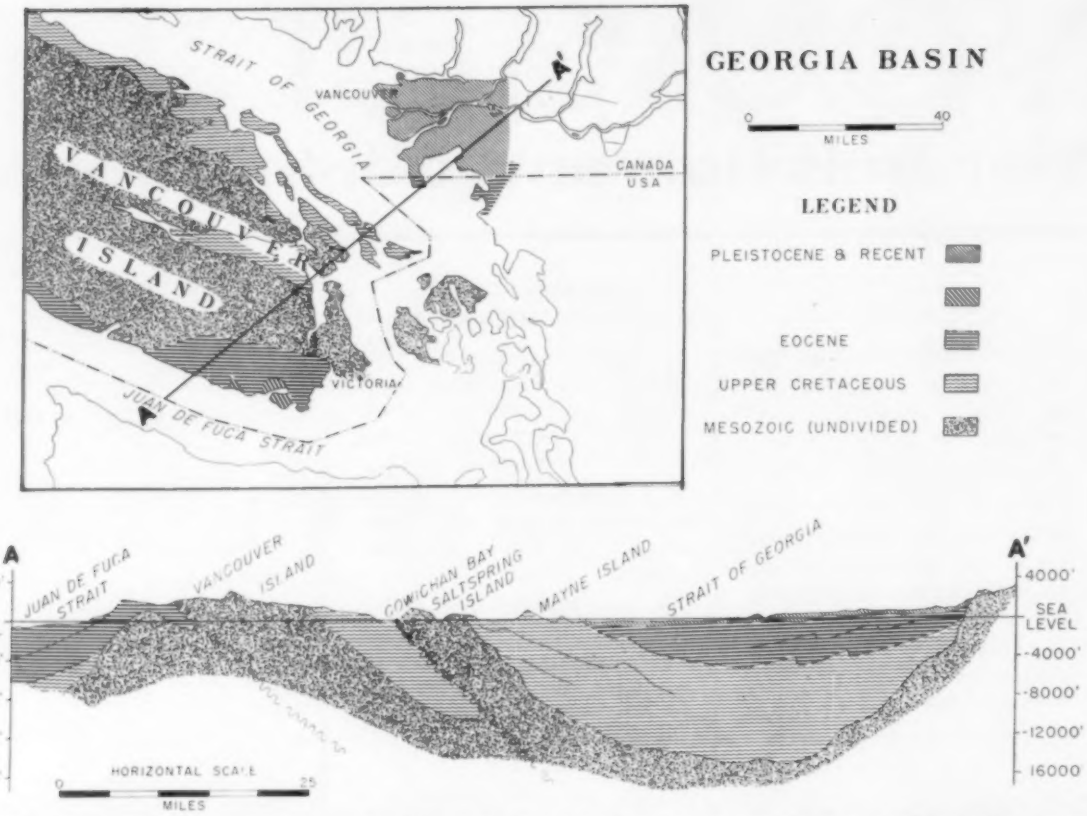

MAP AND CROSS-SECTION showing the general geology of the Georgia basin and an interpretation of the basin underlying Georgia Straits. Fig. 2.

possibly the Cretaceous sediments of these basins were derived from the location of the very mountains which bound them today. The ancestral Queen Charlotte range was probably the source of the sediments of the Queen Charlotte series of Upper Cretaceous age. In the process of yielding these sediments, the mountains were truncated and peneplained. The present mountains are the rejuvenated core of the ancestral Queen Charlotte range.

Georgia Basin

Fig. 2 is a generalized geologic map and cross-section of the Georgia basin. "Mesozoic undivided" as shown here includes Carboniferous, Triassic, and Jurassic metamorphics as well as igneous rocks. However, as far as this discussion is concerned the rocks of these eras are the core of the Vancouver range and the source of the sediments of the Georgia basin. This basin is quite restricted and Cretaceous sediments so far identified in it are poorly sorted and have every appearance of having been dumped. These have been termed the Nanaimo group by Clapp and discussed in detail in his report on the Nanaimo Coal basin.

The same series also may be found in the Gulf Islands where they are folded into partially submerged cuestas. This series consists of up to 10,000 ft. of mainly continental sediments, only the second oldest, the Haslam formation being of marine origin. It should be noted that the Nanaimo series of the Gulf Islands is not as carbonaceous as that of the Nanaimo area further west. From this observation it may be hoped that a marine or brackish water facies of important thickness may underly Georgia Straits. There is, however, considerable evidence which may preclude the possibility of marine strata of Upper Cretaceous age underlying the Georgia Strait.

The Cretaceous sediments in outcrop along Vancouver Island and the south side of the Strait of Juan de Fucia are, as mentioned before, dumped and poorly sorted. On Souci Island, just across the American border, there may be observed a Cretaceous outcrop bearing cobbles showing three generations of conglomerate suggesting that the basin was unstable and very rapid deposition prevailed throughout the entire Upper Cretaceous.

Tertiary sediments underly the recent deposits of the Fraser Delta and outcrop occasionally in that area. Their exact thickness is not known; 6,000 ft. have been identified at Lulu Island and this may increase to 20,000 ft. at Boundary Bay. Weaver reports 17,000 ft., the upper 5,000 ft. of which are marine in the Olympic range. This suggests that the Tertiary strata of the delta area may be the feather edge of a very thick sequence

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THE AUTHOR

W. B. Gallup is consulting geologist with the firm of Gallup, Buckland & Farney, Ltd., Calgary. He is a native of Saskatchewan and a graduate of the University of Saskatchewan. He has worked for Anglo Canadian Oil Co., Ltd., Home Oil Co., Ltd., and the Oil and Gas Conservation Board of Alberta. In 1942, he joined Royalite Oil Co., Ltd., as resident geologist in Turner Valley field; he later became chief geologist for Royalite, and left that company in January 1956 to organize the consulting firm.

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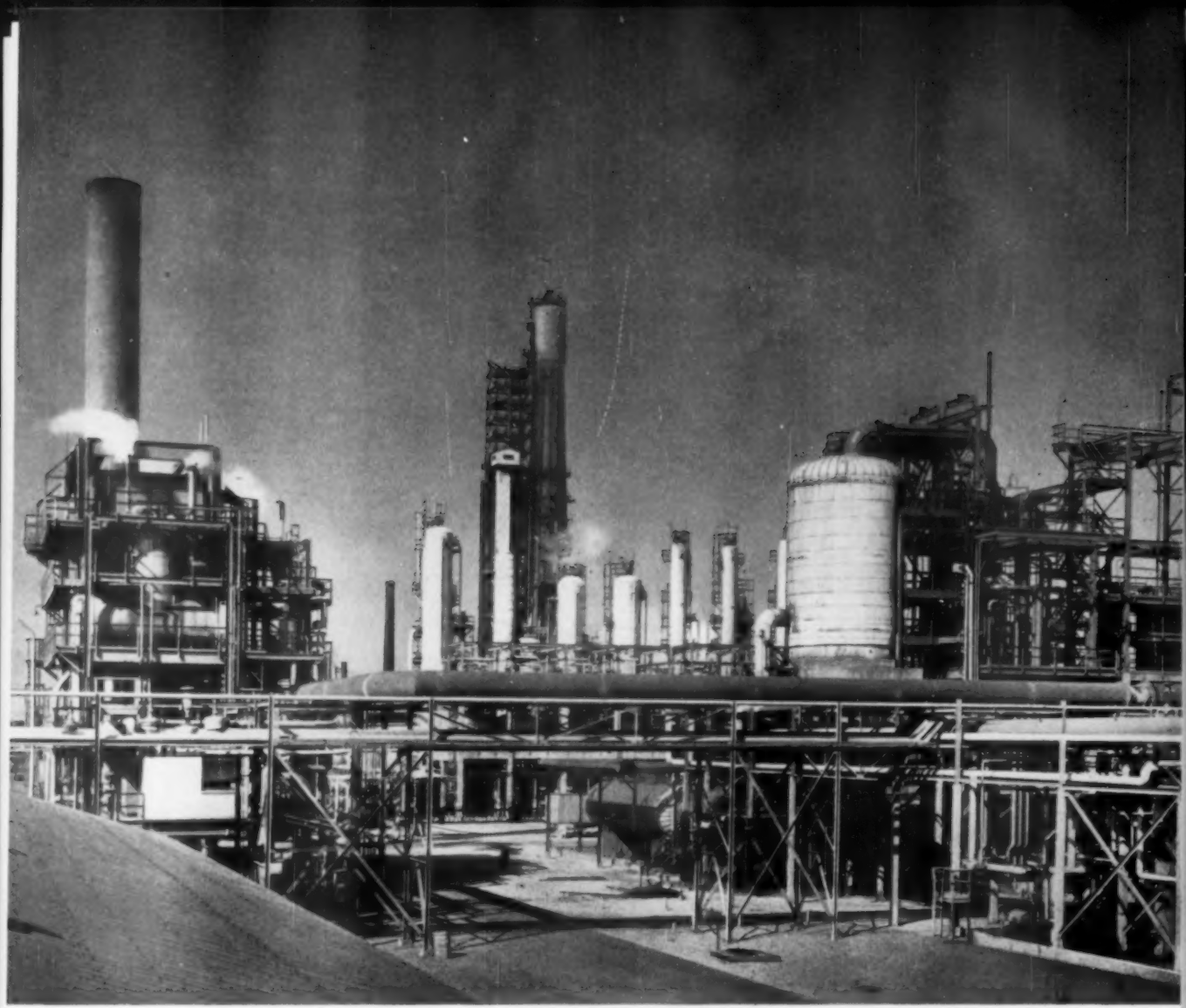

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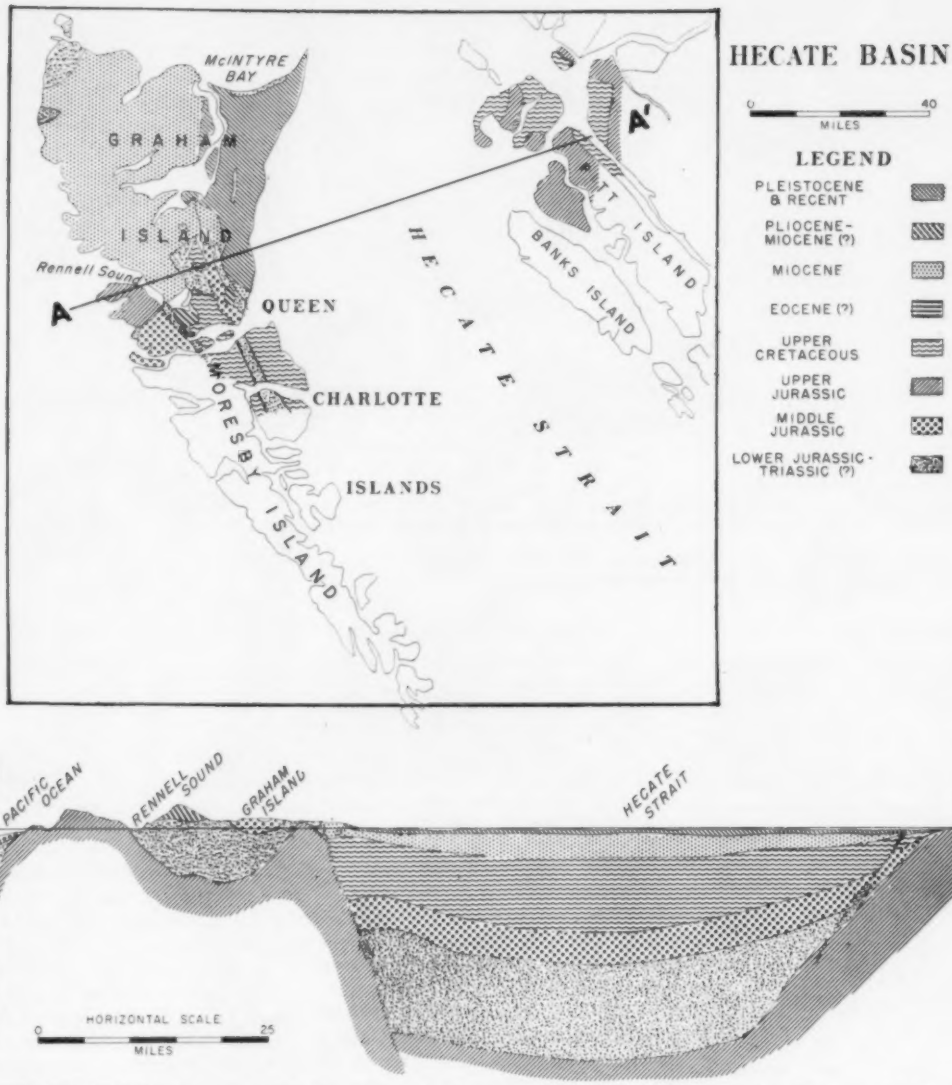

THIS CROSS-SECTION showing a normal fault on the west side of the Hecate basin is interpretative. However, the dimensions of the basin would not be affected much by other interpretations. Fig. 3.

to the south. This could be important—there are no Tertiary strata on the Gulf Islands; therefore, they must onlap the Nanaimo series somewhere beneath Georgia Strait. Further evidence of thick Tertiary strata in the general region is given by J. A. Jeletsky of the G.S.C. who estimates up to 10,000 ft. of cyclic alternation of marine to continental Oligocene on the southwest coast of Vancouver Island.

Structural conditions are favorable. There is considerable evidence that the area may have been subjected to Late Tertiary and recent folding so that even the youngest sediments may be involved in some sort of structure.

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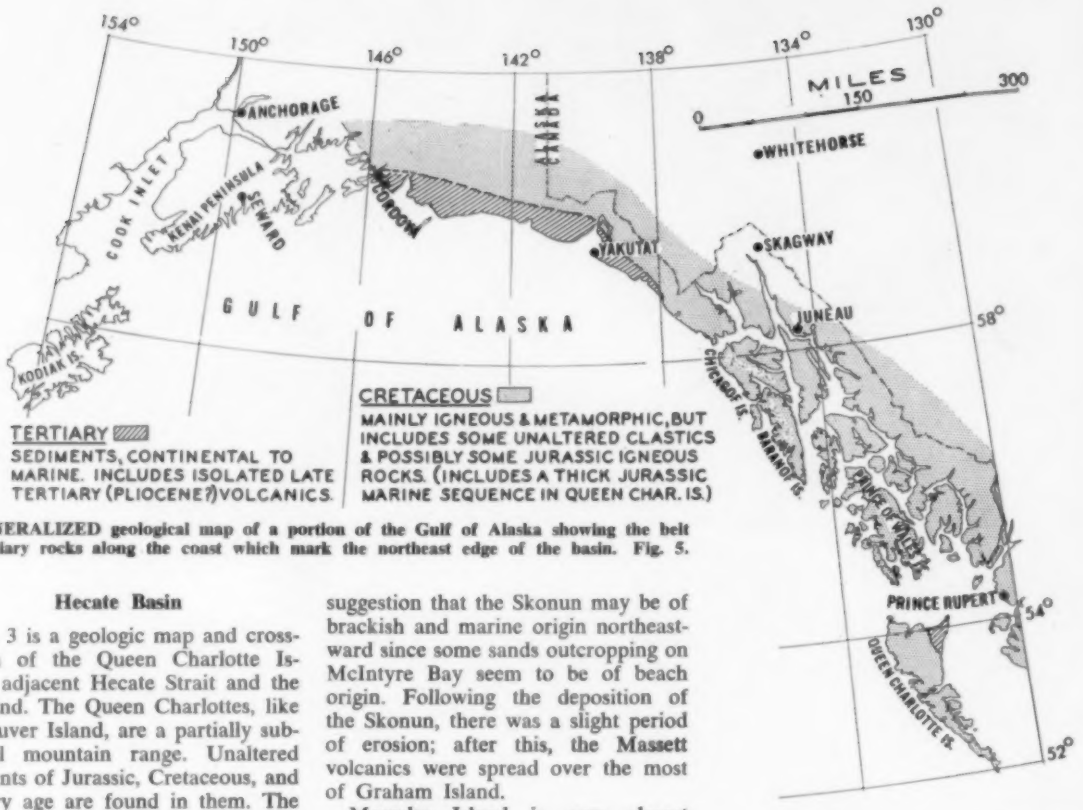
THIS WILDCAT, drilled by Royalite Oil Co., Ltd., is one of the very few tests made in the region. It is the 1 Charlotte, on Graham Island. Fig. 4.



A GENERALIZED geological map of a portion of the Gulf of Alaska showing the belt of Tertiary rocks along the coast which mark the northeast edge of the basin. Fig. 5.

Hecate Basin

Fig. 3 is a geologic map and cross-section of the Queen Charlotte Islands, adjacent Hecate Strait and the mainland. The Queen Charlottes, like Vancouver Island, are a partially submerged mountain range. Unaltered sediments of Jurassic, Cretaceous, and Tertiary age are found in them. The basin is broader and seems to have received more sediments than the Georgia basin.

The oldest rocks so far identified are those of the Maude formation of Lower Jurassic age and represent a true geosynclinal environment in that they consist of a sequence of 10,000 ft. of sediments consisting of argillaceous carbonates grading upwards through tuffaceous rocks. These are in turn overlain by 3,500 ft. of Middle Jurassic Yakoun waterlain pyroclastics. The Yakoun volcanism was a preclude to the great intrusions of Upper Jurassic and probably Lower Cretaceous basic and acid rocks of the Langara and Kano series. This orogeny created the ancestral Queen Charlotte series, mainly of continental origin.

These sediments were deposited on the irregular Jurassic topography and were slightly folded and then peneplained prior to the Tertiary. There was some early Tertiary igneous activity as indicated by the occurrence of minor dykes probably of Eocene age. Following this, the continental Skonun formation was laid down. These strata are mapped as Miocene but may be Oligocene. There is some suggestion that the Skonun may be of brackish and marine origin northeastward since some sands outcropping on McIntyre Bay seem to be of beach origin. Following the deposition of the Skonun, there was a slight period of erosion; after this, the Massett volcanics were spread over the most of Graham Island.

Moresby Island is now almost completely submerged and very few outcrops of Mesozoic or Tertiary sediments flanking the mountain range remain above water. We are therefore dealing solely with Graham Island in this discussion. This island, particularly the northeastern lowland portion appears to be rising. Modern beaches have been identified 30 ft. above the present sea level. It may be visualized then that the island is rising slightly relative to Hecate basin, a movement which may be associated with the normal fault shown in the west central portion of the cross-section. The Tertiary-Cretaceous contact in eastern Graham Island is mapped by McKenzie as unconformable. However, a west dip in sediments identified as Tertiary on Miller Creek seems to indicate that this must be a fault contact as illustrated here. We have no evidence to support the interpretation of the normal fault on the east side of the basin. It is possible that the sequence of sedimentary strata lies unconformably on the igneous rocks which bound the basin. The graben interpretation is merely a suggestion.

It is probable that the regional dip of the northeastern lowland is to the east and that the Tertiary sediments underlying this lowland dip out under Hecate Straits, the west dip mentioned being associated with the fault. It also is probable, considering the tectonic history, that the environment of the northeastern lowland was very much the same in the Skonun time as it is now; and since Quaternary sediments have a marine facies to eastward, it is further possible that the continental strata of the Tertiary Skonun formation outcropping on Graham Island have a marine equivalent underlying Hecate Strait. The continental Cretaceous Queen Charlotte series and the Tertiary Skonun formation of continental and brackish water origin may thus have marine and brackish water equivalents under Hecate Strait.

Oil seeps . . . The oil seeps of the Queen Charlottes are worthy of mention. A filmy oil staining has been reported on specimens from the Maude formation of Frederick Island near Tian Head on the northwest coast. Oil staining and saturation is reported in the Upper Cretaceous Haida formation in the interior of Graham Island. Most interesting are the occurrences of tarry residue in amygdules and fissures in the Massett basalts at Tian Head and Lawn Hill on the east coast. The oil staining in the Maude is probably indigenous to the marine strata in which it occurs. That in the Haida formation may have formed in adjacent Cre-

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taceous rocks or migrated into the Haida from the Maude.

The occurrence of bitumen in the basalts is a little more difficult to explain. It has been suggested by MacKenzie that these hydrocarbons were engulfed by the volcanics as they passed through or over petroliferous rocks. In view of the circumstances this is a reasonable solution.

The Gulf of Alaska Basin

The Gulf of Alaska Tertiary basin is by far the largest of the three discussed here. Fig. 5 is a generalized map of the area. Only a narrow strip on the north and northeastern border of the basin is presently above sea level. Further, the seaward side of this basin is not bounded by a mountain range perched on the edge of the Continental Shelf as are the other two and, for that matter, other similar basins farther south along the coast. Marine charts do not indicate that any similar submarine topography exists. There is a broad submarine feature of relatively low relief just off the coast in the southeastern portion of the basin known as the Fairweather grounds. Whether this is a structure or an igneous mass is not known.

Strat traps possible . . . Tertiary sediments outcropping in the narrow belt along the coast are mainly continental in origin although brackish water and marine facies do occur, and marine facies may be anticipated basinward to the southwest. That the whole area was tectonically quite active throughout the Tertiary is indicated by the nature of the sediments and the occurrence of unconformities both intraformational and formational. There was a very marked period of tectonic activity and erosion following the Eocene and prior to Miocene-Pliocene deposition. This and other such events provide an excellent opportunity for stratigraphic traps.

The whole belt of sediments is involved in rather complex structures, some of which may have post-Pliocene features. Structures at the western end of the basin toward Cordova have rather anomalous strikes and in some instances the sediments are rather intimately associated with volcanic rocks of Pliocene or more recent age. In the center portion of the belt, there occurs a parallel series of anticlines and synclines having the same strike as the coast.

Southeastward in the Yakutat area, glacial and glacio-fluvial material obscures most of the Tertiary but from what is known of the structure it appears that it is as complex as that of the western end of the basin. In the extreme southeastern end, some volcanics outcrop and it is possible that these are of the same age as those mentioned above. It is the occurrence of these, recently elevated above the sea, on the coastal plain, that suggests the Fairweather grounds may be of a similar nature. This, of course, is mere conjecture as these grounds very well may be a large structure involving sediments.

"All three basins offer opportunities for petroleum exploration in as yet undeveloped areas. The thick sequences of sediments apparently occurring in association with marine facies is encouraging in all cases."

Oil seeps and shows . . . Oil seeps of various quantities are common throughout the area, particularly in and adjacent to the central structural subprovince. Some production has been taken from the Tertiary by California Standard, east of Cordova although there is no activity here at the present time. Four wells have been drilled on the Sullivan anticline along the coast in the vicinity of longitude 142° west. Little or no information is available on the results of these borings but it is understood that some shows were encountered. Present operations here are being conducted by Kerr-McGee on Phillips Petroleum Co. acreage. Colorado Oil & Gas Co. is presently drilling a deep test at Yakutat; the location was made in 1956 on a seismic feature.

The size of the basin (a probable 18,000 cu. miles of sediments occupy the outcrop belt) and the numerous seeps and oil shows suggest that this basin is a most attractive petroleum prospecting area. While it is true that much of the sediments occurring in outcrop areas are of continental origin, the historical geology of the basin indicates that a marine facies should be developed immediately to westward.

Conclusions

All three basins offer an opportunity for petroleum exploration in as yet undeveloped areas. It is true that the geological problems in each case are most difficult but the thick sequences of sediments apparently occurring in association with marine facies is encouraging in all cases.

In the Gulf of Georgia, the absence of seeps in the well developed and well exposed structures of the Gulf Islands are discouraging, but the thick section of Tertiary on the east side of the basin is quite attractive.

The numerous seeps and oil shales on Graham Island show that petroleum has been formed in the Mesozoic and probably in the Tertiary. A thick section of sediments of both eras may be anticipated underlying northeastern Graham Island and adjacent Hecate Strait. A better understanding of the possibility of the Tertiary of the Hecate basin might be achieved by a study of the Tertiary sequence in the Gulf of Alaska where there is more outcrop and more evidence of petroleum occurrences.

It is probable that in any of the three basins here discussed, oil will eventually be found but only following a serious combined geological and geophysical exploration program.

The Hecate and Gulf of Alaska basins appear most attractive at the present time but the access problem is not nearly as difficult in the Georgia basin.

Bibliography

Brooks, Abbe and Goode, "Geography and Geology of Alaska," U.S.G.S., prof. paper No. 45.

Clapp, C. H., "Geology of the Nanaimo Map Area," G.S.C. Mem. 51 (1914).

G. S. C., "Tertiary Rocks of the Hesquiat, Nootka Area, West Coast of Vancouver Island, B. C.," paper 53-17 (1954).

"Geological Map of British Columbia," map 932A.

Jeletsky, J. A., Stratigraphy of the West Coast of Vancouver Island Between Kyuquot Sound and Esperanza Inlet, British Columbia: G.S.C. paper 50-37 (1950).

Martin, George C., Petroleum Fields of the Pacific Coast of Alska: U.S.G.S., Bull. 250 (1905).

Preliminary report on Petroleum in Alaska: U.S.G.S. Bull. 719.

MacKenzie, J. D., Geology of Graham Island, B. C.: G.S.C. Mem. 88 (1916).

Plafker, George; Miller, D. J., Reconnaissance Geology of the Malaspina District, Alaska: U.S.G.S. (1954).

Miller, D. J., Preliminary report on the Geology and Oil Possibilities of the Yakataga District, Alaska: U.S.G.S. mimeographed report, 48 pp., map, chart (1951).

Late Cenozoic marine glacial sediments and marine terraces of Middleton Island, Alaska: Jour. Geol., Vol. 61, pp. 26, 32-33 (1953a).

Preliminary geologic map and structure sections of the Bering Glacier A-2, A-3 and A-4 and Icy Bay D-2—D-3 quadrangles, Yakataga district, Alaska. U.S.G.S. open file map (1953b).

Weaver, Charles E., Tertiary Stratigraphy of Western Washington and Northwestern Oregon: Univ. Wash. Publ. in Geology (1937).

Paleontology of the Marine Tertiary Formations of Oregon and Washington, pts. 1-3: Univ. Wash. Publs., in Geology, vol. 5, 1 table (1942).

Correlation of the Marine Cenozoic Formations of Western North America; Bull. Geol. Soc. America, vol. 55 (5), pp. 569-598 (1944).

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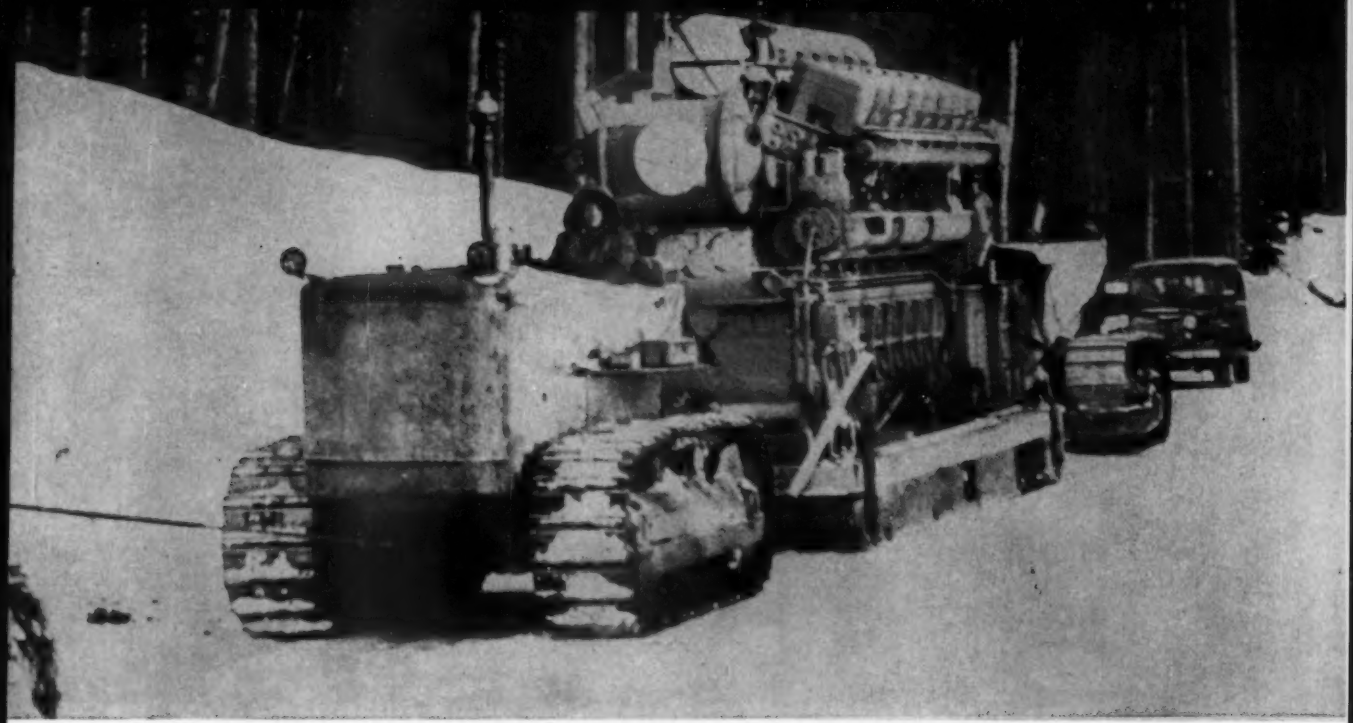

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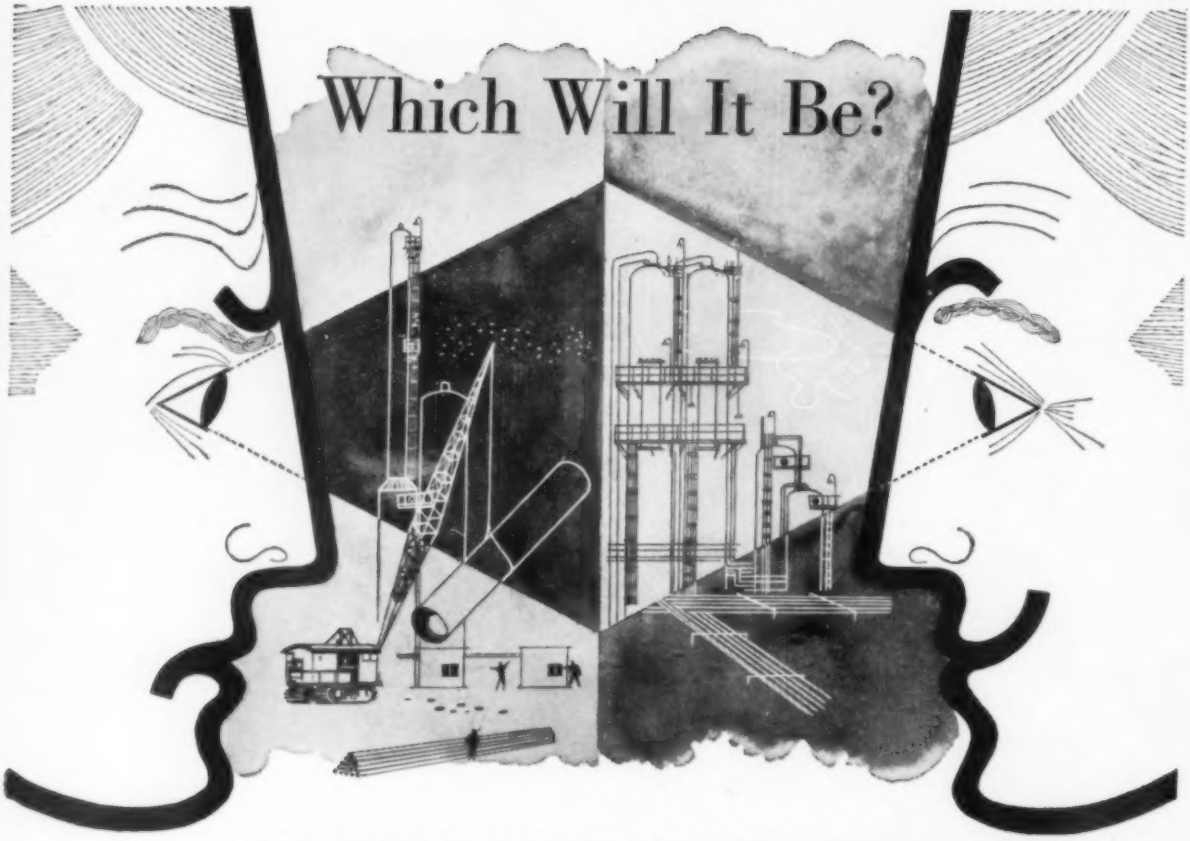

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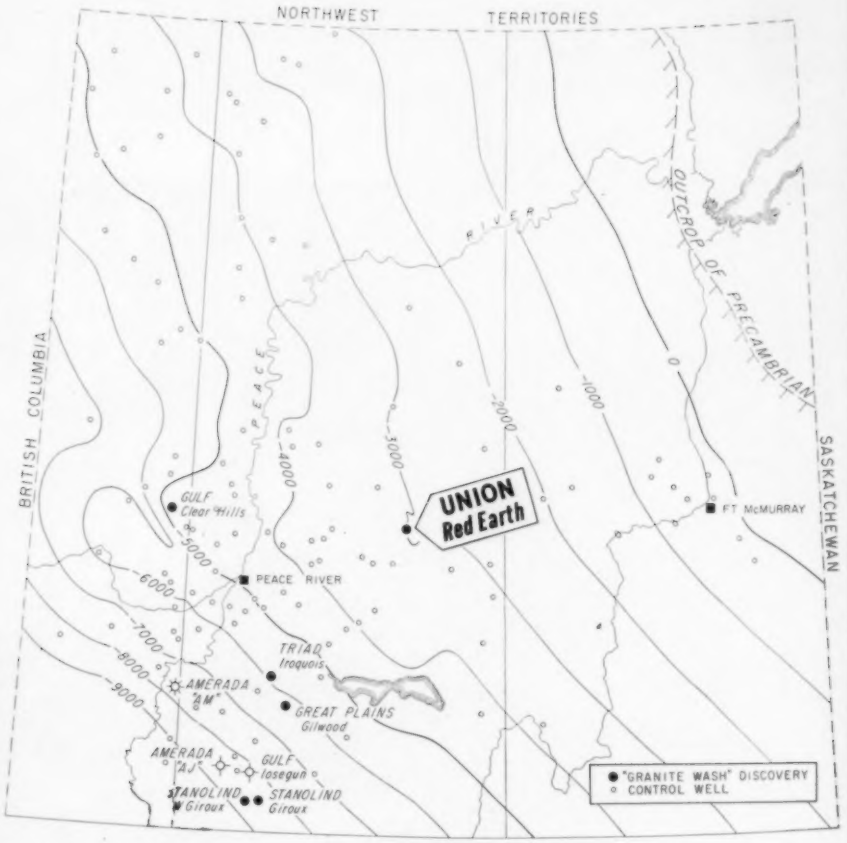
RED EARTH 14-8 being drilled in February 1956, by Regent Drilling Co.



STRUCTURE MAP of northern Alberta showing contours on top of Precambrian. Also shown are the Granite Wash discovery and control wells. Fig. 1.

Canadian operators are wondering . . . two years of drilling could answer . . .

"Is Red Earth a Major Oil Field?"

By Robert R. Roethke

THE first week in February 1956 saw the biggest rush for petroleum and natural-gas reservation rights in Alberta since the Pembina boom of 1953. In one week, oil companies had filed applications on approximately 10,000,000 acres in the Peace River area of north-central Alberta.

This major land rush was touched off by an announcement by Union Oil Co. of California that it had found light gravity crude oil in the Granite Wash formation, at its Red Earth wildcat on LSD 12, 17-87-8w, of the fifth meridian, about 220 miles northwest of Edmonton. Interest in this well was created by two significant facts. First, the oil was found at a moderate depth in the Granite Wash zone, a relatively new potential producing horizon in northern Alberta in which only eight previous wells had found varying quantities of oil at widely scattered locations. Second, a vast amount of semiexplored land was available from the Alberta Government on a reservation basis.

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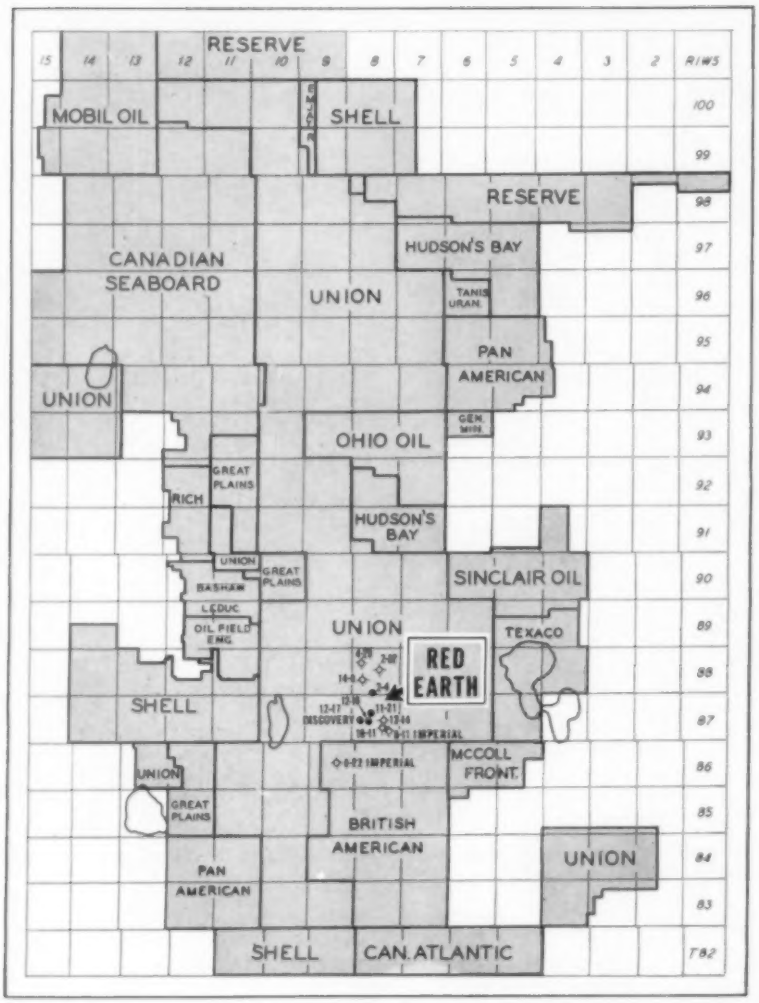
The Granite Wash Reservoir

The term Granite Wash has been applied to a series of rocks which



WELL LOCATION MAP shown in conjunction with land-holding map of area. Fig. 2.

vary widely in character, age, and origin. As used here, Granite Wash is defined as those sediments immediately overlying Precambrian rocks that are of a clastic nature or intimately associated with clastics. The Granite Wash, or basal Paleozoic sand, in the Peace River area has been distributed around, and to a large extent, over the Peace River ridge. Fig. 1 presents the structure of the Precambrian in northern Alberta along with the Granite Wash discovery wells and structure control wells.

Origin . . . In all probability, detrital material was accumulating throughout the Middle and most of Upper Devonian time in the land mass of the Peace River ridge. During periods of renewed errosion this material was carried out by streams and deposited as alluvial fans or on flood plains. As the sea encroached on the land mass many of these deposits were reworked and redeposited under shoreline conditions. At certain intervals during the close of Elk Point time, the sands were distributed far out to sea, forming a fairly widespread deposit of well sorted sandstone grading to siltstones and shales further basinward. It seems probable that Granite Wash may eventually be found as residual deposits, alluvial deposits, shoreline deposits, and marine open sea deposits.

Lithology . . . At Red Earth the Granite Wash material consists of sand, shale, and silt. The sand is fine to coarse-grained, well rounded to angular, with poor to excellent sorting. It is predominantly quartzose with feldspar present in variable amounts. The first appearance of the sand in the Red Earth wells comes in below the Elk Point and has been both abrupt and gradational.

The Manning (or Gilwood) sand also is often referred to as Granite Wash. This is recognized to be Granite Wash where it rests directly on the Precambrian; however, in many cases it is underlain by the Elk Point with a second possible clastic section separating the Elk Point and Precambrian. In these cases the upper sand is referred to as the Manning and the lower sand as the Granite Wash. The Manning is not developed at Red Earth.

The thickness of the porous Granite Wash sand has varied from 0 ft. at Red Earth 16-11 to 122 ft. at Red Earth 12-14. These two wells prominently demonstrate the topography of the granite in the area. Red Earth 12-14 penetrated a thick wash section below the water line, and 1 mile to the southeast Red Earth 16-11 found no porous sand but entered the granite 457 ft. higher. Character of the Granite Wash has varied noticeably from well to well as to the amount of shale, the type of sorting, and the size and shape of sand grains. All of the wells have at least partially cored the wash section. Porosities average 14 per cent and permeability values vary from 1 millidarcy to 1 darcy. Drill-stem tests have established the water line to be —2,970 ft., which happens to coincide with the granite top in the discovery well.

Fig. 3 is a general east-west cross-section that illustrates the lithology at Red Earth. The Wabiskaw, Basal D-1, Nisku and Grossmont Reef and the Slave Point have all been tested at Red Earth. The only encouraging recoveries have been small amounts of oil cut mud from pin-point porosity found in the upper limestone of the Slave Point formation. Cores from this formation have shown very low permeability values, but it could develop into a second producing hori-

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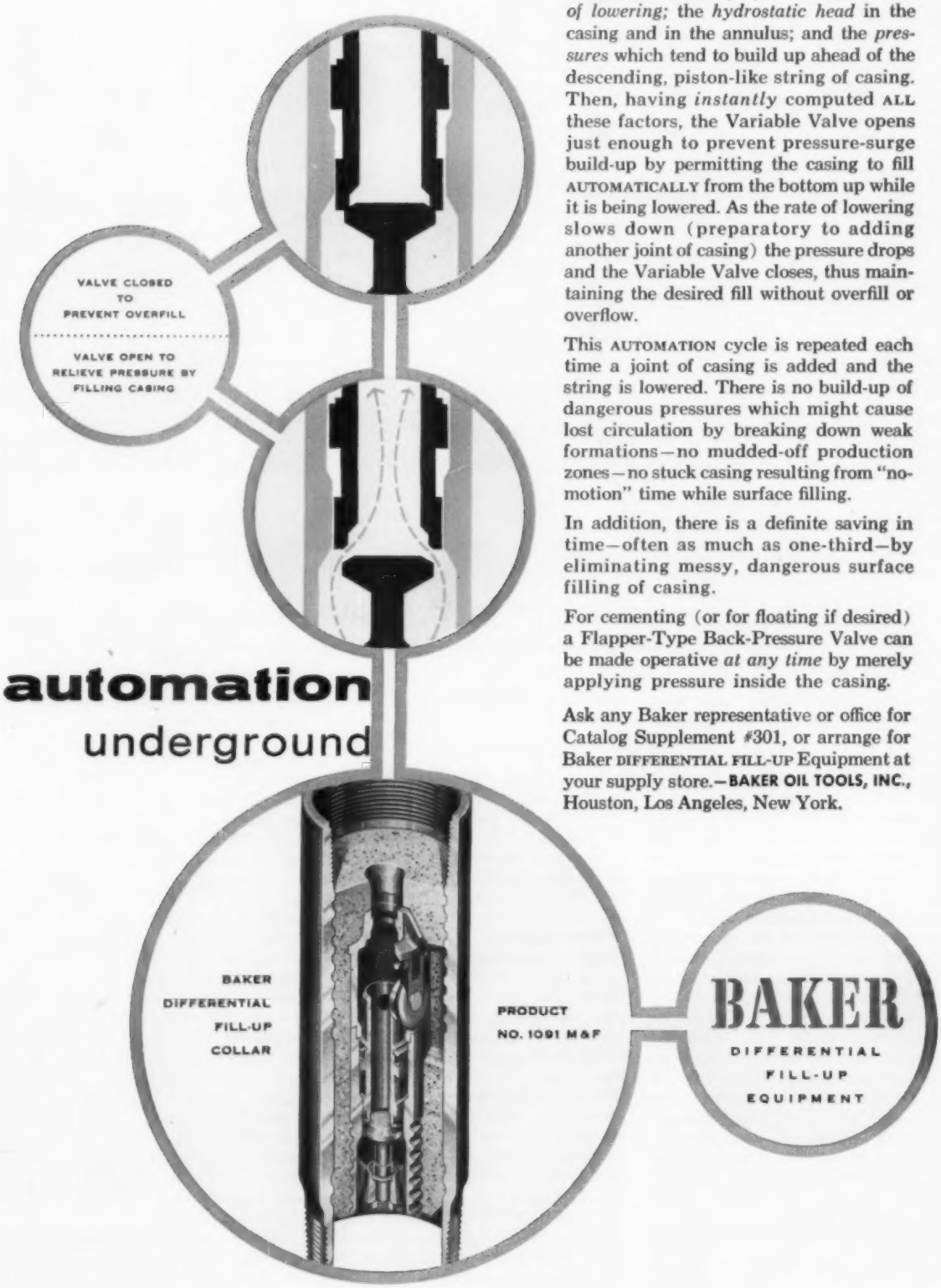
THE AUTHOR

Robert R. Roethke is district superintendent of drilling and production for Union Oil Co. of California at Edmonton, Alta. He attended college at North Dakota State and was graduated from the University of Oklahoma with a B.S. degree in petroleum engineering in 1949. He served 3 years as a pilot in the U. S. Naval Air Corps. His employment with Union started in July of 1949. Prior to transferring to Canada in October of 1955, he has held various positions in engineering, drilling, and production in California.



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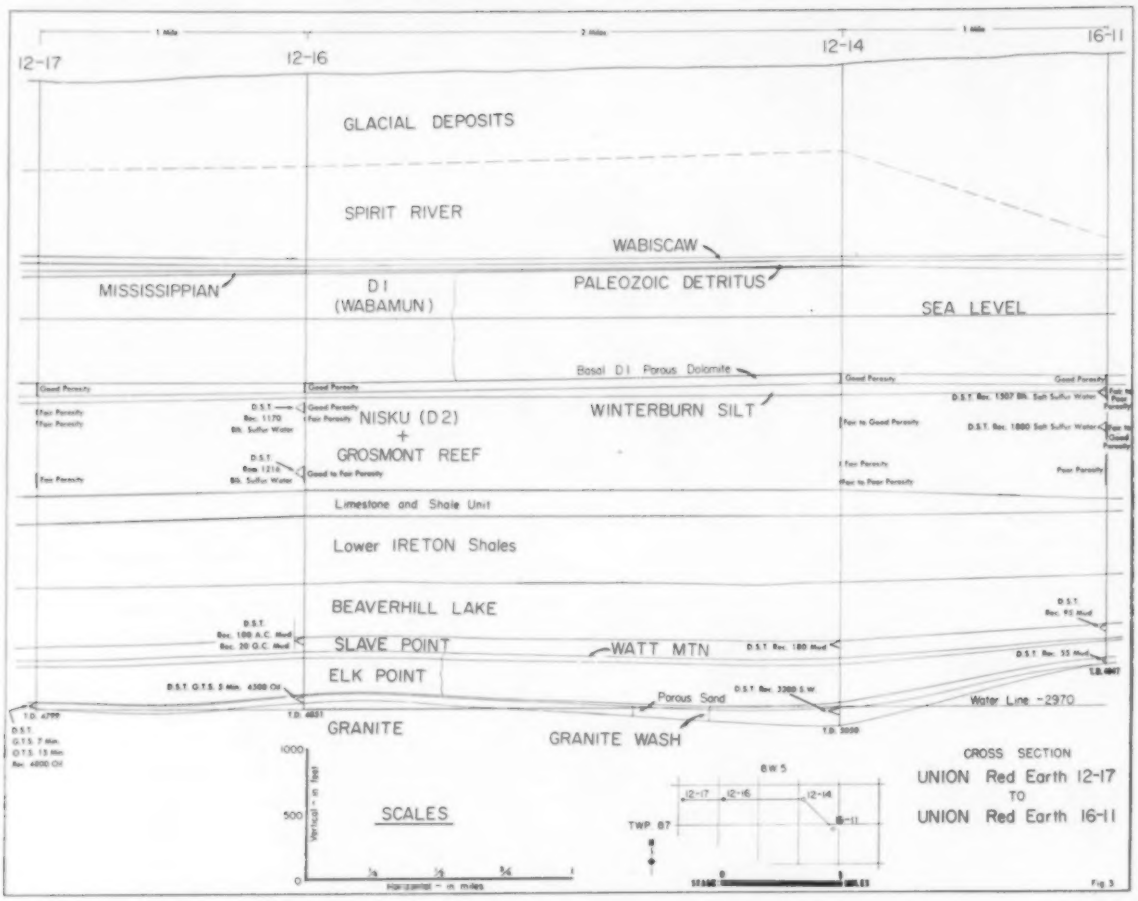

GENERAL EAST-WEST cross-section that illustrates the lithology at Red Earth. Fig. 3.

zon should future drilling locate more favorable permeabilities in this zone.

Geophysical

A flying magnetometer survey by Canadian Aerial Survey, Ltd., covering much of the Peace River area and including all of Union's Red Earth reservations was purchased by Union in April 1955. The existing coverage was obtained from previous reservation holders in September 1955. From the interpretation of the magnetometer map and the preliminary seismic maps, the location for Red Earth 12-17 was chosen. Following the discovery of oil in this well, a seismic crew was moved into the area to make a survey utilizing multiple shot holes and multiple detector techniques. During the fall and winter months of 1956 and 1957, Union employed two seismic crews to provide additional reconnaissance control as well as to continue the detail shooting program to provide followup drilling locations.

Development

Union Red Earth 12-17 was spudded on January 1, 1956, and was completed as a Granite Wash oil well on February 13. The Granite Wash section was encountered at 4,730 ft. and porous sand was reached at 4,746 (—2,935) ft. A drill-stem test of the interval 4,740 to 4,765 ft. had gas to the surface in 7 minutes at a rate too small to measure, followed by oil to the surface in 15 minutes at an estimated 30-bbl. per hour rate. The pipe recovery was 3,595 ft. of gassy sweet brownish-black 38°-gravity oil. Initial flow pressure was 1,265 psi., final flow pressure 1,830 psi. and shut-in. pressure was 2,210 psi. after 30 minutes. The hole was diamond cored from 4,765 to 4,797 ft. and encountered fresh granite at 4,781 (—2,970) ft. Two more drill-stem tests from 4,762 to 4,771 ft. and from 4,771 to 4,797 ft. had results similar to the initial test with no water detected in any of the tests. Seven-inch casing was cemented at 4,797 ft. and the well was perforated with four ½-in. holes per foot from 4,785 to 4,771 and 4,765 to 4,749 ft. While displacing the mud with water the well came in flowing and was gaged at a 40-bbl. per hour rate through a 20/64-in. bean with 745-psi. casing pressure and 500-psi. tubing pressure and a gas-oil ratio of 160 cu. ft. per bbl.

A followup well was drilled approximately 5 miles to the north in LSD 14, 8-88-8w5. This well penetrated the Granite Wash at 4,776 (—3,008) and granite at 4,888 ft. On March 13, 1956, a test of the upper portion of the wash yielded 4,620 ft. of salt water. After coring the entire Granite Wash, this well was abandoned as a dry hole and the rig was moved out of the area before spring breakup. Even though Red Earth 14-8 did not find the wash section oil bearing, it had a thick, well developed, porous and permeable Wash sand with pressures similar to the discovery well, indicating that the sand was from the same reservoir.

During the winter months of 1956-57, seven additional wells were drilled at Red Earth by Union. Fig. 2 pre-

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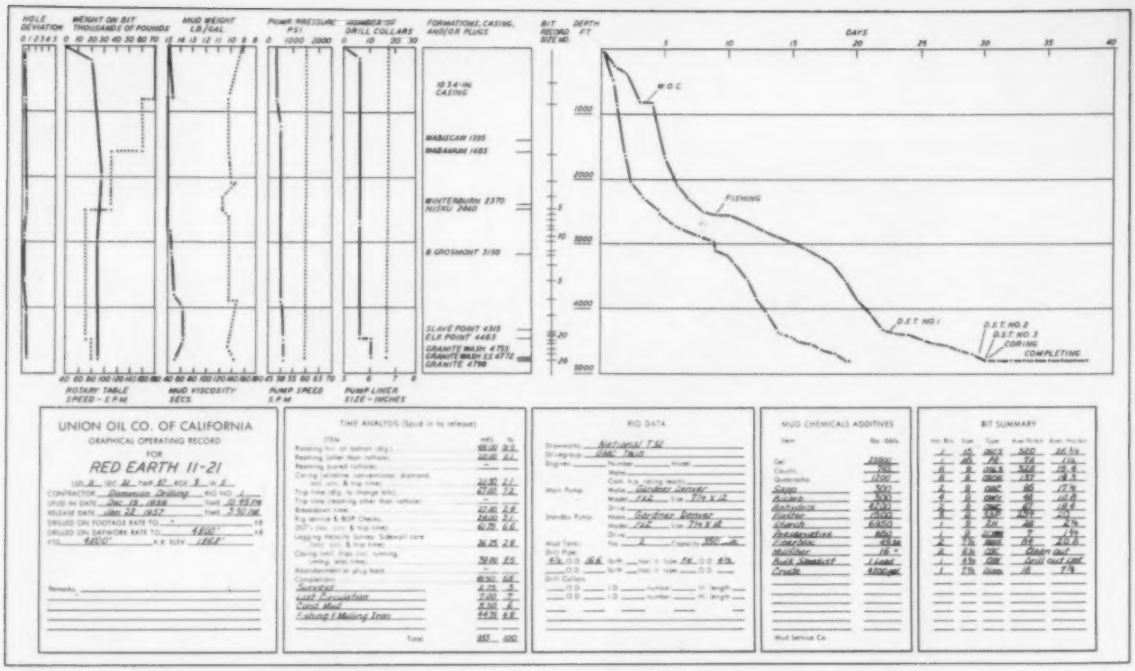

GRAPHICAL OPERATING RECORD for Red Earth 11-21, a typical well in area. Fig. 4.

TABLE 1—SUMMARY OF WELL DATA—RED EARTH

Well	Spud date	KB (ft.)	Granite Wash sand (ft.)	Granite (ft.)	Status and remarks
Red Earth					
12-17	1- 1-56	1,811	4,746	4,781	Oil well, perf. 4,785-4,749 ft.
14-8	2-19-56	1,768	4,776	4,888	D & A, water
12-16	10-27-56	1,879	4,785	4,836	Oil well, perf. 4,836-4,801 ft.
12-14	11-19-56	1,935	4,912	5,034	D & A, water
11-21	12-15-56	1,868	4,772	4,798	Oil well, Barefoot 4,800-4,766 ft.
16-11	12-30-56	1,986	4,615	4,628	D & A, granite
2-4	1-26-57	1,839	4,773	4,811	Oil well, perf. 4,800-4,771 ft.
2-22	1-30-57	1,855	4,831	4,912	D & A, water
4-29	2-11-57	1,726	4,636	4,639	D & A, granite

sents a well-location map in conjunction with land holding map of the area. Table 1 presents a summary of all the wells drilled by this company in the Red Earth area.

Drilling and Completing

The drilling program on the Red Earth wells has been to cement 10¾-in. casing in a 15-in. hole at 600 ft., drill a 9-in. hole to the Granite Wash, and diamond core the wash section until fresh granite has been penetrated. The first 4,000 ft. of hole consists mainly of shales, limestones, and dolomites with minor stringers of anhydrite. Fresh water gel mud is used in the drilling of this portion and gyp base mud is used from 4,000 ft. to total depth to combat the massive anhydrite section which occurs in the Middle Devonian formations.

No unusual drilling problems have been encountered in the area and an average well is drilled to total depth in approximately 30 days using 25 bits. Fig. 4 represents a graphical operating record for Red Earth 11-21, a typical well.

Standard electrical logs, MicroLogs or Microlaterologs and Gamma-Neutron logs have comprised the logging programs at Red Earth.

Completions have been made with gun perforations, jet perforations, and barefoot in both 7 and 5½-in. casing. In wells where all of the wash occurs above the water line, barefoot completions appear to have the most merit, and in wells which penetrate the water in the wash above the granite permanent type of completions have proved the most successful.

Production

After completion the wells have been produced into test batteries and the oil has been hauled to tank cars at Nampa, Alta. The Alberta Conservation Board set the M.P.R. at 50 bbl. per day. However, for the purpose of evaluating the reservoir, they have allowed the wells to be produced at rates up to 200 bbl. per day for a few months interval.

On test production during the winter months of 1956-57, 24,000 bbl. of oil has been produced from three wells. From this short production history it is apparent that these wells have a serious paraffin problem. The tubing tends to plug off with hard paraffin to 2,200 ft. If production is taken at a slow rate the tubing will wax off completely within a week.

Several bottom-hole-pressure bomb surveys have been performed on the producing wells and have recorded the static bottom-hole pressure at 2,290 psig. On a production test at Red Earth 12-17 the well was produced at a 228-bbl. per day rate through a 8/64-in. bean and a pressure drop of 56 psi. was observed giving a P.I. of 4.07 bbl. per day per pound pressure drop; 5,500 bbl. of oil was produced from this well with no decrease in bottom-hole pressure.

Subsurface fluid samples collected from Red Earth 12-17 established the bubble-point pressure at 1,386 psig. at 108° F., which is several hundred pounds below the pressure at the point of sampling and, of course, indicates the reservoir exists in an undersaturated condition. Differential pressure depletion of the fluid re-

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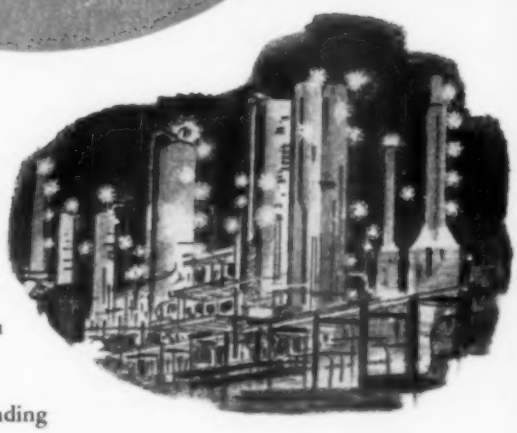

The selective extraction of the aromatic hydrocarbons, Benzene, Toluene, Xylene, or the production of an aromatics-rich concentrate, are the chief functions of the aromatics extraction process — with the concentrates thus obtained destined for use as blending stocks for high octane aviation gasoline, as well as premium and regular grades of motor fuel.

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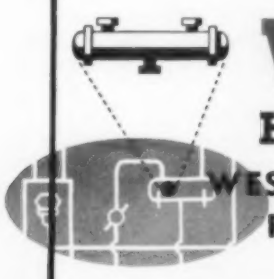

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sulted in the liberation of 314 s. cu. ft. of gas per barrel of residual oil with an associated formation volume factor of 1.167 bbl. of saturated fluid per barrel of residual oil. The viscosity varied from 1.127 cp. at the saturation pressure to 2.955 cp. at atmospheric pressure.

Future

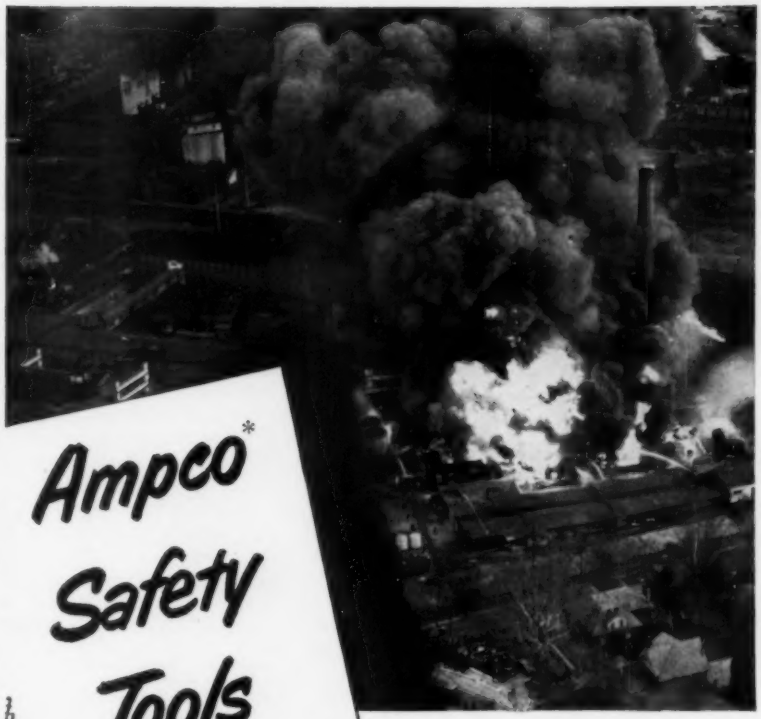
From the limited number of holes drilled at Red Earth, several pertinent facts have been noted. Granite Wash distribution is controlled by an irregular granite surface and the oil accumulation occurs on the flanks of the granite highs. Geophysical and subsurface methods will indicate where to find the oil; however, the area will require an extensive drilling program to completely evaluate these indications. In this area of granite highs and lows it is possible that oil wells will be found in the midst of dry holes and vice versa.

To date, drilling operations in the area have been confined to winter. At least half of the land is muskeg waste. The access route consists of 100 miles of narrow, winding, poorly drained road through uninhabited bush country and usable during the winter months only. This road is presently being widened, ditched, drained, and straightened and will then be maintained as a dry-weather road. Union Oil Co. will have one rig drilling in the field by August and will move additional equipment in this fall. The winter operation will probably find several other companies evaluating their properties in this area.

Planning on associated problems has begun in the anticipation that Red Earth will develop sizable reserves. Possible routes for a 140-mile pipeline from Red Earth to the Peace River Pipe Line terminal at Valleyview are being studied. Lease automatic custody transfer is seriously being considered.

A more reliable method of communication to replace the present 50-w. AM radios is being sought for the future. Experimentation with various types of insecticides is presently being performed. Since this is such a remote area, a planned townsite with comfortable accommodations and adequate recreational facilities will have to be provided to attract competent operating personnel.

Today, Red Earth centers in a vast unexplored area of northern Alberta with the nearest commercial production 70 miles distant. Four successful Granite Wash oil wells have made Alberta oil men keenly aware of the possibilities of the area. Two years' drilling could answer the question, "Is Red Earth a major oil field?" **End.**



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OIL TAXATION
Canadian versus American
. . . A critical appraisal of the two systems

By A. G. Burton

Part 1 of Two Parts

MODERN TAXATION is a very complicated and intricate matter. This is a result of the continuous effort of revenue officials to protect revenue, and by businessmen and their advisers who wish to pay the smallest amount of tax possible. The petroleum industry, being an extractive one, finds in addition to the normal taxation problems which every business has, it also has certain special ones. These problems occur because of the tremendous risk involved—crude oil must be found, it cannot be manufactured. Also, when the product is found and produced, the source of the petroleum company's business gradually melts away and cannot be replaced as in, for instance, the logging and lumbering business where new trees can be planted. This in turn has caused the extractive industries to require special tax provisions to compensate for these peculiar factors.

Certain expenditures in the oil industry represent the cost of day-to-day business, whereas a similar type of expenditure in another industry would represent a nondiminishing capital asset. When an oil company starts in business the first things it must have are rights to petroleum and petroleum products which are located below the surface of the land. An ordinary company, acquiring an interest in land, normally will place a plant thereon, from which it will base its operations; that land is a permanent asset which does not depreciate in any form, except in unusual economic conditions. By and large it has a better-than-average chance of appreciating during the period of its use. However, the so-called land acquired by an oil company will not appreciate in value but over the years it will depreciate and finally become worthless.

We are speaking here of a true petroleum corporation whose only use for the land is to produce petroleum products; it has no intention of exploring and discovering oil and then turning around and selling the oil in place for a substantial gain, since this is not a part of true petroleum operations.

In actual fact a petroleum corporation does not buy land but merely rents it for a term certain or for a term during which petroleum can be produced from these properties; as such it is a rental and not a purchase.

Author is a partner with Peat, Marwick, Mitchell & Co., Calgary.

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Land and Exploration

The Canadian Government always has taken the approach that this form of rental of lands in effect represents a purchase of lands and that the land is a permanent asset which is not subject to depreciation. Under Canadian tax laws, the costs of acquiring these rights must always remain a capital expenditure and can't be recovered as a cost of operation.

There is one small exception to this; if a corporation or certain other entity acquires a lease directly from a governmental body, and abandons that lease without any production from it, then the cost of acquiring the lease may be charged off as an expense. This exception does not include reservations acquired from governmental bodies, it does not include the purchase of leasehold interests from freeholders (which include such organizations as the Canadian Pacific Railroad), nor does it include a case where one company acquires a lease directly from the government and subsequently resells it to another corporation or individual. As a result, the application of the exception is very narrow, since large amounts are not paid for leases unless they are on semiproductive land, and in such instance it is relatively rare that no production is obtained. Also there is no provision for abandonment of a part of the lease. If, for instance, a section is acquired and production is found on only one quarter-section, then no relief is allowed under the act.

Situation favors U. S. . . . The United States has been more realistic in its approach to this particular problem. If a piece of land is productive, the company is allowed to charge cost depletion at least, so that the cost of the land is absorbed into cost of production over its productive life. If the land is dry, then it may be claimed as an expense at the time of abandonment.

This divergence in regulations between the two countries is one fundamental reason why United States operators are in a more favorable tax position than Canadians. If a Canadian corporation pays $500,000 for a reservation and, after due exploration and geological expenses, finds that productive possibilities are poor, it is then in a position of having spent $500,000 which in due course only can be replaced by earning $500,000 after taxes from other operations. If, however, a United States corporation carried on branch operations in Canada and spent the same $500,000 for the reservation, it could then claim the amount (in the United States) as a loss on abandonment, and its over-all loss would be approximately half that amount. Therefore, in this particular instance, the United States company has about a 2 to 1 advantage over the Canadian company.

Exploration expense more lenient in Canada . . . After acquiring an interest in land, an oil corporation will carry out general geological, geophysical, and exploration operations. The various modern methods of prospecting for oil will be used and in the final analysis, if these tests show favorable results, a well will be drilled.

The Canadian tax approach to these expenditures is somewhat more lenient than that of the United States. All expenditures of this type (with the exception where annual lease rentals exceed $1 per acre, in which case the excess over $1 is disallowed for tax purposes) may be immediately charged off to expense for income tax purposes—it is not necessary to capitalize any part of these expenses. This, of course, does not cover equipment installed at the wellhead, such as tubing, sucker rods, pumps, etc.; these

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FOR PETROLEUM MEN — No. 1

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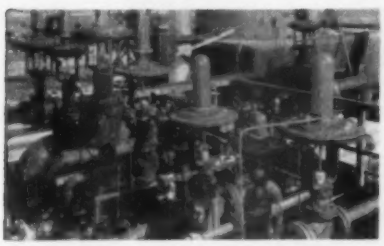
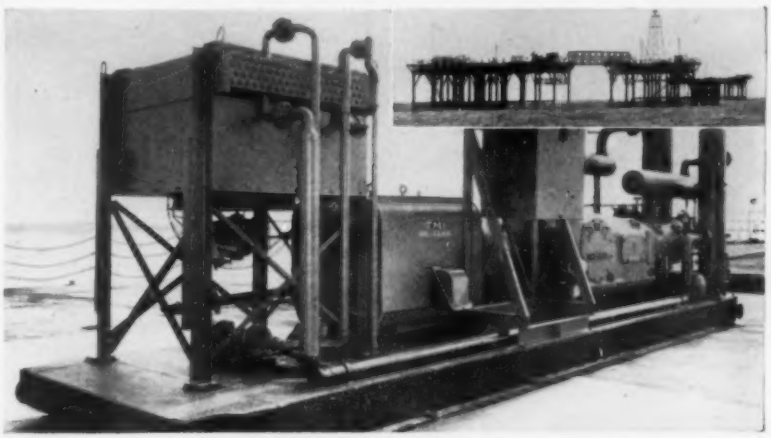


been obtained with silicone lubricated Stabilflo valves handling steam, water, oxygen, gasoline, light hydrocarbons, natural gas, chlorine, hydrochloric acid, cold sulfuric and nitric acids, and ammonia. To receive a free trial sample of Dow Corning Valve Seal A, circle .... *No. 3*



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The windings of this "Sil-Clad" motor are insulated with Dow Corning silicone resins, silicone resin-impregnated components, and a tape made with Silastic,* the Dow Corning silicone rubber. Outer protection is provided by a steel housing coated inside and out with a silicone based paint.

According to Electric Machinery, this "Sil-Clad" motor is more reliable and more resistant to corrosion than conventional Class A or B totally enclosed, fan cooled motors of the same rating. And it cost $3000 less than a comparable TEFC motor built with ordinary insulating materials. Lower initial costs combined with greater reliability and lower maintenance costs account for the rapidly increasing market for such motors. *No. 1*

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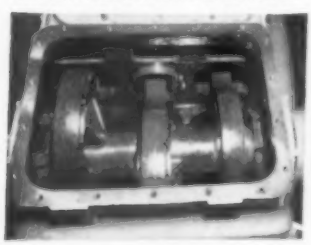

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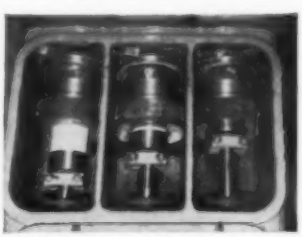


Hardened steel, ceramic, and special service plungers are available. Complete plunger and stuffing box assembly can be removed and repacked as a unit.

This new heavy-duty pump is built by Gardner-Denver especially to meet oil well servicing requirements. It has power and dependability to pay off for you. It's now in production. For details and prices, consult your distributor or the Gardner-Denver oil field office near you.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois—In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario—Gardner-Denver Export Division, 233 Broadway, New York, N. Y.
Oil Field Offices: Dallas, Houston, Tulsa, St. Louis, Los Angeles, New York, Pittsburgh, Denver, New Orleans, San Francisco, Kansas City, Winnipeg, Edmonton.

must be capitalized and may be depreciated at a maximum rate of 30 per cent per annum on a reducing-balance basis.

In addition, for income-tax purposes, these chargeable expenses will only be deducted in any 1 year to the extent that income is available. This means that if exploration expenditures have exceeded income, the profit-and-loss account for tax purposes will come to a nil balance, and any excess expense will be carried forward to future years. Since the profit-and-loss account comes to a nil balance, no loss is incurred in that year even though expenditures exceed income, and therefore there is no restriction to the usual 5-year limit for carry forward of losses.

Since there is no such restriction, the losses may be carried forward for an indefinite number of years until enough income has been realized to absorb these expenditures.

This treatment is quite beneficial for new companies entering the business since almost no matter how fortunate a corporation may be, the cost of drilling wells, together with other exploration expense, makes it highly unlikely that any bona fide oil company will realize a net profit within 6 years. This probably is not true in the case of companies who buy only productive or semiproductive acreage. In these cases, they probably will have paid a large bonus for their land and that bonus is not treated as a cost for income-tax purposes.

Restrictions hurt Canadians . . . We have referred to writing off the expenditures for general geological, geophysical, exploration, and drilling expenses. The Canadian Government allows these but only to certain specific organizations. A corporation is not allowed to claim them unless its principal business is production, refining, or marketing of petroleum, petroleum products, or natural gas, or exploring or drilling for petroleum or natural gas, or mining or exploring for minerals.

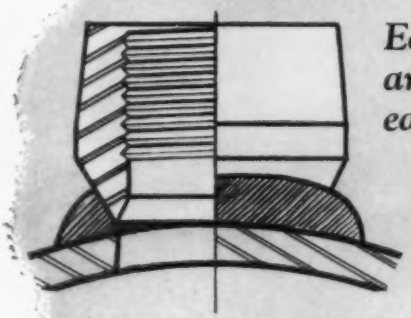
If you are in business as an association, partnership, or syndicate, that entity must have been formed for the purpose of exploring or drilling for oil or gas to be allowed to claim this type of expenditure.

A partnership whose principal business is marketing or oil refining does not come within the scope of the provisions, and therefore would not be permitted these expenditures for income-tax purposes.

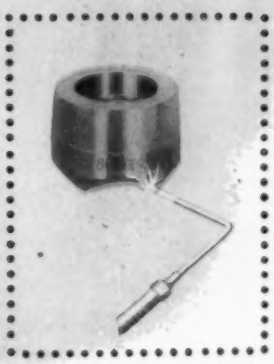
No such restrictions face United States organizations. There is no doubt that this restriction has prevented

A New Line of Branch Connections

W-S COUPLETS



Economical and easy-to-install



Readily modified for small diameter installation

W-S Couplets are designed to function as universal outlet connections for tanks, process vessels and pipelines. They eliminate the need for large, expensive field inventories and costly delays in fabrication.

On most tank, and large piping installations they are used as received. On those few applications where attachment is to be made to a small diameter pipe, the W-S Couplet is easily modified by contouring the welding end with an acetylene torch to mate with the curvature of the pipe diameter. Couplets are made with extra length and heavy wall to permit contouring without detriment to the threaded or socket end.

W-S Couplets are available in sizes ¼" through 2", with screw-end or socket-welding dimensions . . . also in a 90° elbow.

Send for Bulletin CP-1-57. Write to W-S Fittings Division, H. K. Porter Company, Inc., P. O. Box 95, Roselle, N. J.

HKP W-S FITTINGS DIVISION
H. K. PORTER COMPANY, INC.

many Canadian entities from making part of their resources available to develop the Canadian oil industry. It has also prevented United States entities, whose principal business is not oil, from spending funds in Canada.

From the standpoint of the oil business in Canada these regulations are definitely restrictive, but the revenue department possibly has a sound argument. Their approach is that they do not wish to be involuntary partners in wildcatting.

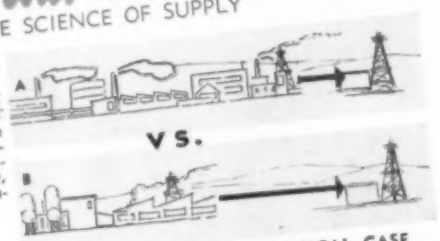
If, for instance, a manufacturer of shoes makes a profit of $200,000 from that business on which he would pay approximately $100,000 of tax, he might say that he would take $100,000 of that profit, of which only $50,000 belongs to him and $50,000 belongs to the taxation department, and spend it on drilling a well. If he is successful, he is then in line for additional profits; but if he is not successful he has only lost $50,000 of his own money rather than $100,000, and the government has lost $50,000. The validity of this argument is open to a good deal of doubt since we find that the U. S. has permitted this for a good many years and the over-all economics of the two countries does not appear to suggest that this has been detrimental.

Logistics*

... as an aid to business

* LOGISTICS—THE SCIENCE OF SUPPLY

EXAMPLE: Company A versus Company B. They market the same product to the Oil Industry. A has personal contact, a Plant on the spot, one-fourth the distribution costs.



Any supplier to the Oil Industry of Canada who has not manufacturing facilities in Calgary had better take careful stock of the following facts: Calgary is the Head Office location of ninety percent of Canada's Oil Industry. More and more suppliers are moving in to cut distribution costs, be closer to top management. Not only that, Calgary is more attractive to all industry than any other City in North America. Two planned Industrial Locations offer one low PACKAGE DEAL including deep base roads, rail lead, water, power, natural gas and sewage supply in the plant site cost. Cost itself is among the lowest anywhere with all those plusses! Utility costs are very low, water and power are in full supply at industry rates. Now's the time for your business to come to CALGARY . . . where the business is!

GET THE FACTS . . . TODAY!

For full details, plus rates and current vital statistics write K. S. Ford, Coordinator of Industrial Development, City Hall, CALGARY, Alberta, Canada.

THE LOGISTICAL CASE for your move to CALGARY:

1. Canada's Oil Capital, centre of nine-tenths of all oil business.
2. Planned Industrial Locations, your choice of TWO!
3. Low-cost electric power at industrial rates.
4. Natural Gas in quantity supply at low cost.
5. Plentiful water all year round.
6. Competitive freight rates at Canada's crossroads.
7. Stable labor force nearby—locations are within city area.
8. All utilities supplied to site for cost of site alone.
9. Good industrial neighbors like G.M., Firestone, Goodrich, Crane, Willard, Prest-o-lite, etc.

THE MOVE IS ON TO

Calgary

Canada's Oil Capital -where the business is!

No individual rights . . . Because of this line of reasoning, an individual has substantially no rights in Canada to claim these expenses. If a person enters the business as an individual he has no right whatsoever to claim general geological and geophysical expenses, no matter how much oil he may produce. By a special concession granted in 1953, he is permitted to deduct his drilling expenses from the production. If, however, he drills a dry hole, possibly on the perimeter of a field, the cost of drilling that dry hole is treated as a capital expenditure to him and he cannot deduct it from his oil revenues, or from any other revenues.

This effectively prohibits an individual as such from incurring exploration expenses since he substantially must use tax paid dollars for any venture into oil exploration. As a result of these regulations, it is highly inadvisable for any person to operate in Canada as an individual, and one should always operate in the form of a partnership, syndicate, or association. Since many people do not wish to operate with partners who may or may not involve them in unexpected liabilities, this in turn reduces the amount of money which Canadians are prepared to invest in the search for oil.

And more restrictions . . . The same section of the Canadian Income Tax Act which permits certain corporations and other entities to claim these general geological, geophysical, exploration, and drilling expenses has a further restrictive phrase in each instance. This phrase is, "in Canada." By and large petroleum knows no geographic or political boundaries; however, the tax act pretty well restricts Canadian corporations and entities to operations within Canada, again with a very minor exception. This is similar to the regulations stated above for individuals whereby drilling costs may be charged off against production from the productive wells, but no cost of land, leases, or other rights, nor indirect expenses such as general exploration, geological, and geophysical expenses outside of the boundaries of Canada can be claimed.

United States entities are not so restricted. Granted they are restricted as far as Canadian income taxes are concerned, but this does not bother them since they are operating first in the United States and secondly in Canada. They pay tax to Canada only

CANADA—Oil and Gas Unlimited!

on Canadian operations; therefore if their expenditures exceed their income they may charge that excess expenditure against their United States income. The converse is a Canadian-incorporated entity which commences operations in the United States; if these expenditures are incurred it cannot charge them against either its United States income or its Canadian income for Canadian income-tax purposes.

As a result, Canadian corporations find it necessary to set up separate companies incorporated and resident in the United States to carry on any of their operations outside of Canada. Since Canadian corporations are no longer allowed the privilege of consolidating their tax returns with subsidiary companies, then any expenses which exceed income outside of Canada must be met with capital dollars.

There is one further restrictive factor in Canada which tends to deter Canadians from investing in the oil industry. If an individual investor participates in two or more partnerships, syndicates, or associations, he will only be able to charge off all his expenditures if each of the ventures is successful. In other words, if one venture is successful he must pay tax on the excess of income over expenditures; if the other venture is unfortunate enough to wind up with a series of dry holes and no income, or the income is less than the expenditures, he is not permitted to deduct the excess expenditures which he has made within the second venture from the excess revenue which he has received from the first.

Since the law of averages of finding oil in the ground is not too great, then it is obviously a poor gamble to take an interest in a number of different syndicates; while 1 out of say 10 may succeed, the other 9 result in a loss of tax-paid dollars, whereas taxes must be paid on the income received from the successful operation. To the individual who has sufficient money to make such an investment the odds are extremely low, since he is probably already in a substantial tax bracket and will probably retain only 30 or 40 per cent, at most, of his oil revenue after taxes. And out of that 30 or 40 per cent he must bear all losses.

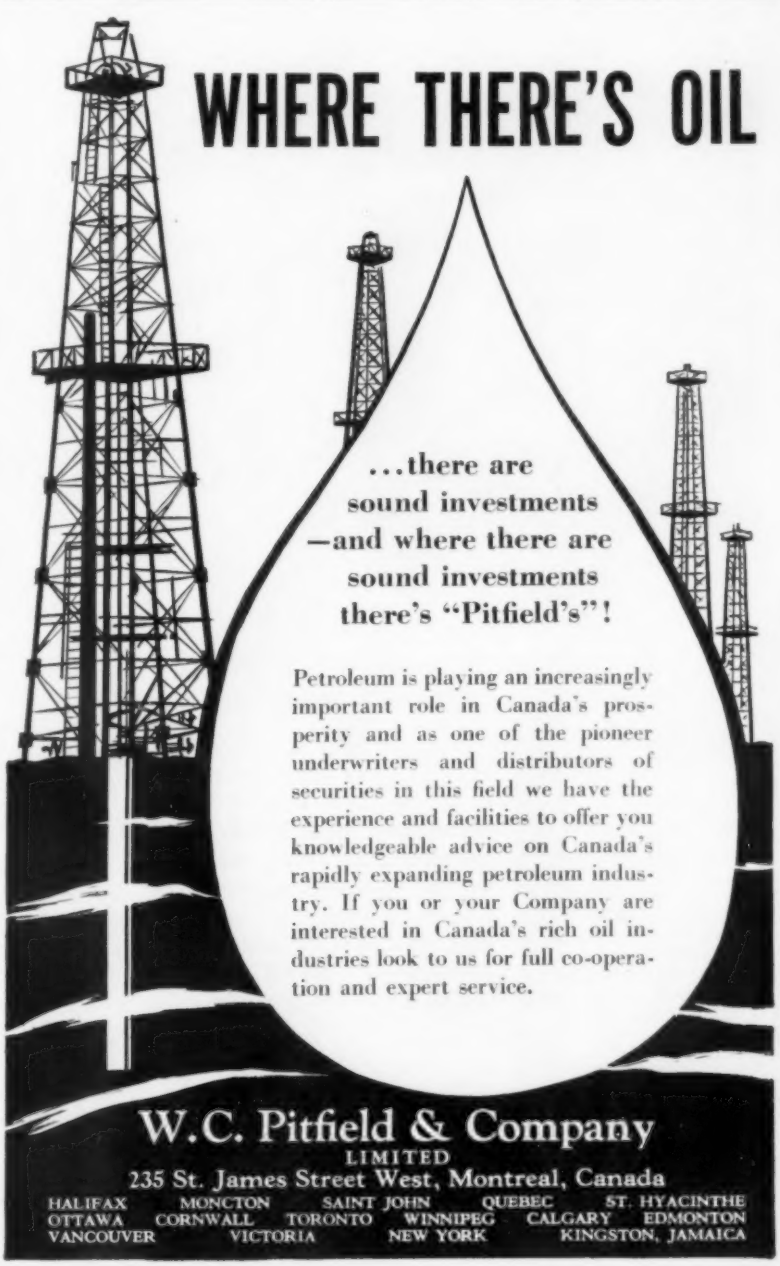
Canadian vs. American Depletion

Canadian depletion for working interests is 33.33 per cent of the net profits. This sounds like a reasonable allowance on the surface; however, the Canadian Government looks upon the term "net profits" as the sum of all income less the sum of all expenditures.

Because Canada is such a large country, this can mean that a corporation has an interest in two properties a thousand miles apart. One property is productive, whereas a good deal of money may have been spent in general geological, geophysical, exploration, and drilling expenses on the other property, but all to no avail. Before any depletion can be claimed there must be more than sufficient revenue from the producing property to offset all the expenses incurred on it, together with all the expenses incurred on the nonproducing property.

Since the production of oil and gas is the life blood of a oil company, and since every barrel produced represents a diminution of that life blood, it is necessary for a bonafide oil company to continue to explore and find new oil to replace that being produced. With a situation such as this, it is quite likely that a company can continue producing for 20 years or more and never be in a net-income position. As a result, it will have received no benefit whatsoever from the depletion regulations. Yet when its gross income exceeds its expenses, excluding depletion of land costs, it is subject to tax.

Land costs are considered a capital expenditure. Since they are not al-


WHERE THERE'S OIL
...there are sound investments —and where there are sound investments there's "Pitfield's"!
Petroleum is playing an increasingly important role in Canada's prosperity and as one of the pioneer underwriters and distributors of securities in this field we have the experience and facilities to offer you knowledgeable advice on Canada's rapidly expanding petroleum industry. If you or your Company are interested in Canada's rich oil industries look to us for full co-operation and expert service.
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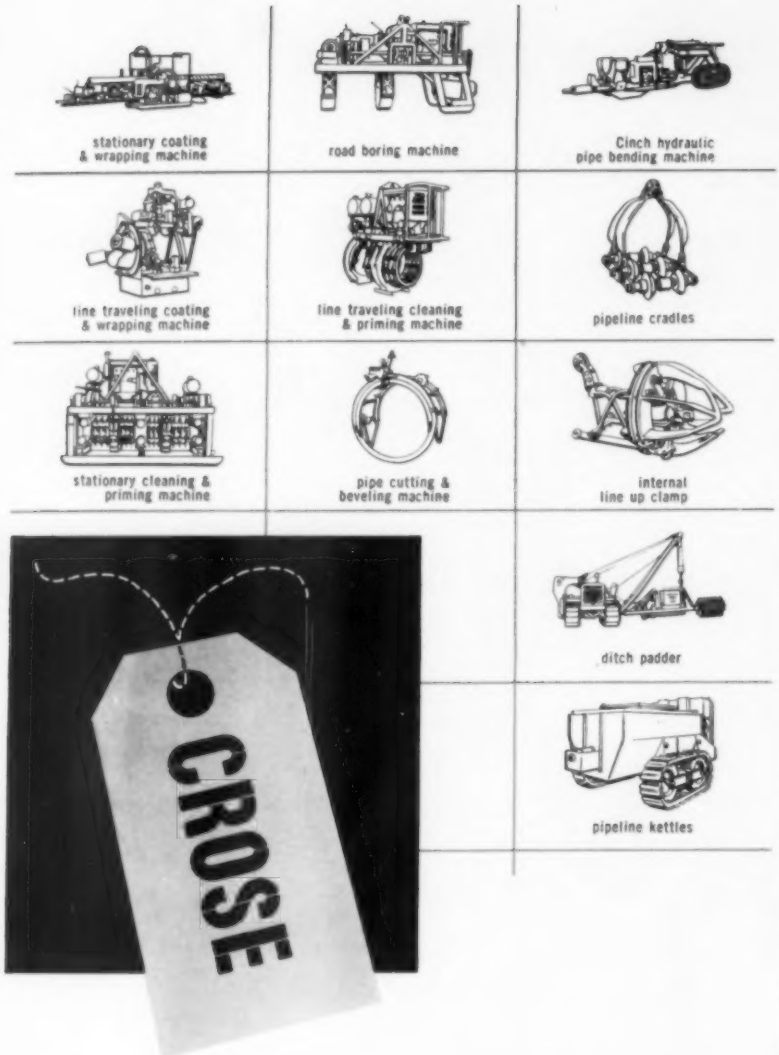

THIS NAME ASSURES QUALITY PIPELINE EQUIPMENT

At Crose the word "quality" means two basic things. First, that the equipment has been engineered and designed to perform under the toughest conditions. Secondly, that the equipment will deliver long-term performance with maximum efficiency and lowest maintenance costs. That's the kind of quality you get in Crose equipment — and it's available through many strategic supply points.

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Crose
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lowed as such for tax purposes, the only way in which they can be recovered from a standpoint of dollars and cents is if depletion rights can be realized. Until a company has recovered sufficient depletion to cover these land costs, it always will be out of pocket as far as dollars are concerned. Since, under Canadian tax regulations, depletion only can be claimed out of net income and taxes must be paid at the same time that depletion is realized. Consequently, it is axiomatic that a company must start paying income tax before it has recovered its cost of operations, providing it has had land cost. This results in a company's paying $1 for tax for every $1 of depletion which it obtains.

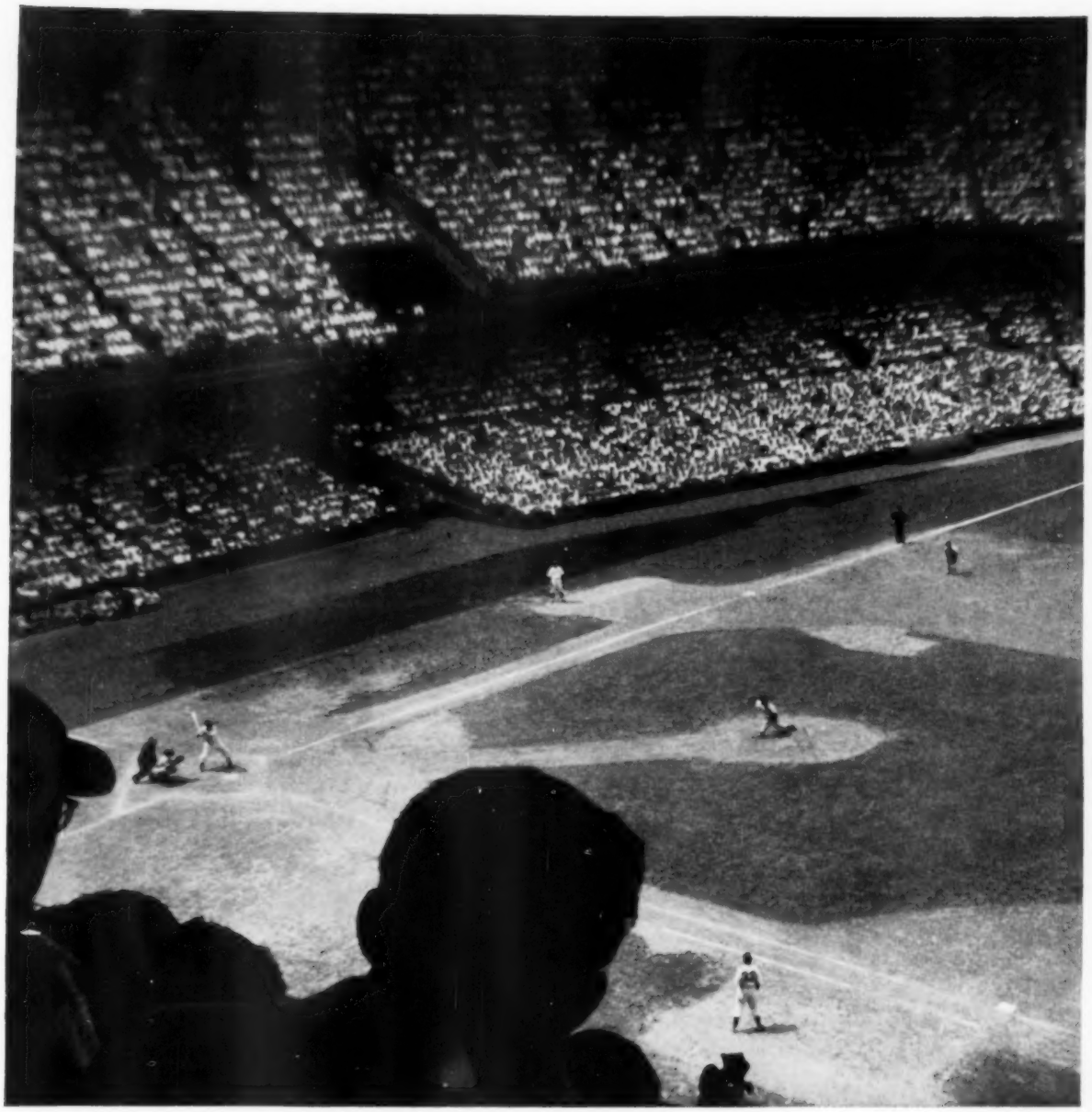
Bear in mind that we are dealing here with a straight exploration and producing company. But this is basically true even in the case of companies with revenue from refining and marketing, because while it may not be quite as apparent, the facts still remain that they are using the revenue from their refining and marketing to cover land-acquisition costs; and they must also pay tax on their marketing and refining profits before they have dollars left over to apply against these land costs.

While some Canadian companies may have paid dividends without paying income taxes, they have actually paid these out of accounting profits rather than out of cash dollar profits. This arises from the accounting treatment of capitalizing exploration and in tangible expenses and writing them off as the oil from those properties is produced, as opposed to claiming them when incurred for income tax purposes.

In the United States, depletion is permitted on a lease basis with no regard to the situation prevailing on other properties. This insures that depletion will be obtained for the wasting asset and that a lease cannot be wholly produced without a fair share of depletion. Since United States companies are allowed their land costs, either by abandonment, by cost depletion, or by percentage depletion, these costs always are included in deductible expense for tax purposes.

To the extent that they obtain percentage depletion, which is in excess of cost depletion, that excess depletion results in surplus cash dollars which can be used to pay dividends to the investor, even though the company has paid no income tax. This means that the investor is receiving compensation for the tremendous risk which he has taken when investing in exploration. **End.**

(Part 2 of this article will appear in next week's issue.)



"Business today has a responsibility to its workers to provide them—as far as possible—with continuous employment, with a fair share of the proceeds of their work, with opportunity for self-improvement and advancement, and with time to enjoy other things in life besides their work."

— M. J. Rathbone, President, Standard Oil Company (New Jersey)

ESSO 75 YEARS

producing energy for an abundant life

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES

SPECIFY MISSION FLUID

A $45 Mission Piston could, in this case, have helped the driller avoid the wash-out that destroyed this $175 liner. With many other pistons, a leak often starts gradually and severe liner damage like that shown above can occur before the pressure drop warns the driller.

Mission Pistons feature rubbers with a fabric backing that assures long, leak-free service. Once a leak starts, however, the fabric back fails and causes a quick pressure drop which warns the driller to stop the pump before liner damage can occur. Mission Pistons are dependable and economical. When you remember

END PISTONS . . . .

that they also protect liners, you see why far more Mission Pistons are used than all other makes combined. Get them from your supply store.

Here is an extreme example of failure of a competitive piston. Notice the groove made by gradually progressive wash cutting that permitted severe liner damage.

This worn Mission Piston Rubber has failed at the fabric back. This typical failure causes a quick pressure drop which warns the driller before liner damage occurs.

Nothing but the finest will bear the name of **MISSION** MANUFACTURING CO.

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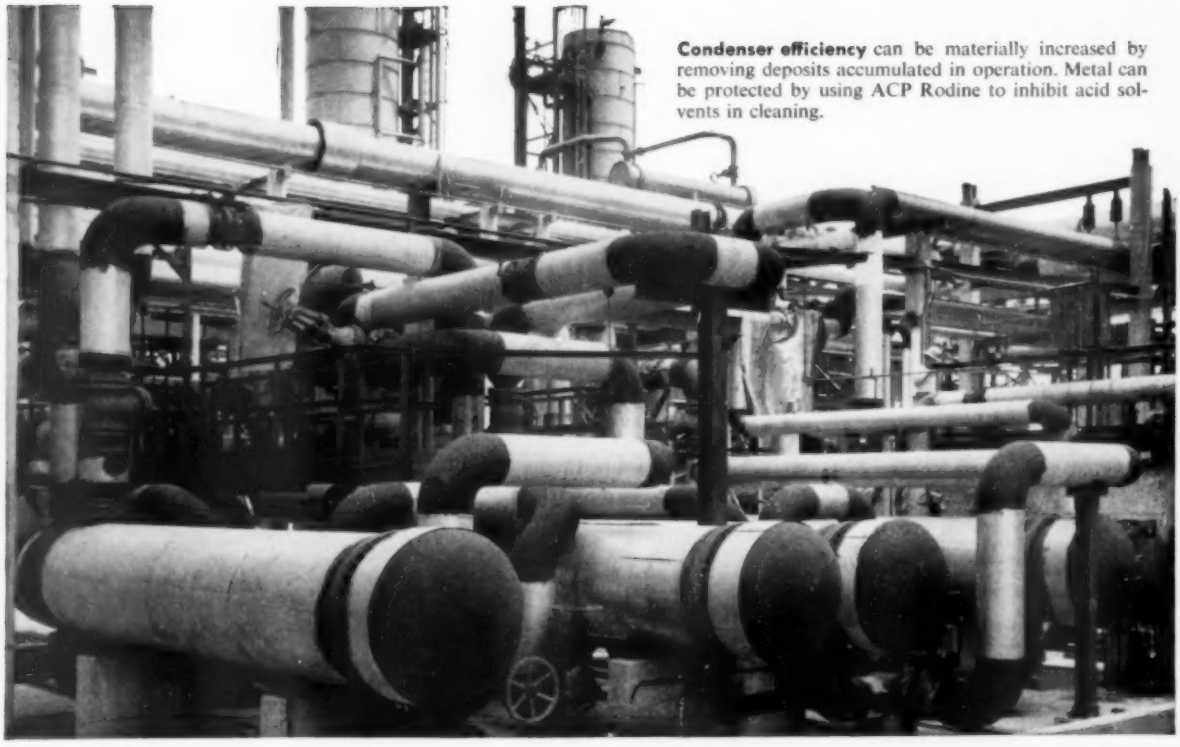
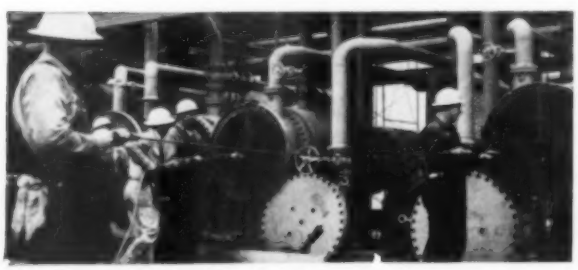


Condenser efficiency can be materially increased by removing deposits accumulated in operation. Metal can be protected by using ACP Rodine to inhibit acid solvents in cleaning.

ACP Rodine® INHIBITS THE ACID SOLVENTS USED IN THE CLEANING OF INDUSTRIAL EQUIPMENT, TANKS AND PIPING SYSTEMS

Make sure that your equipment is protected against acid attack during cleaning—specify ACP Rodine for inhibiting the acid solvents used to dissolve and disintegrate the troublesome deposits which reduce the efficiency of boilers, heat exchangers, cooling systems, condensers, etc. ACP Rodine is water soluble, liquid foaming—a strong inhibitor and a strong detergent. It provides an excellent safeguard with most acid solvents used in industrial cleaning operations. Rodine can be advantageously applied in any type of carbon or low-alloy steel equipment.

Write for complete information today. And remember our technical sales engineers will be glad to discuss your problems with you, and make specific recommendations.



Manual cleaning operations—like the one shown above—require more labor, take more time, are much less effective than chemical cleaning with ACP Rodine-inhibited solvents.

ACP Rodine is also used to inhibit corrosion in sweet wells, condensate wells, and secondary recovery operations. It's economical, too, costs only pennies a day.

AMERICAN CHEMICAL PAINT COMPANY, Ambler 39, Pa.

CHEMICALS ACP PROCESSES

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New Chemical Horizons for Industry and Agriculture

the OIL AND GAS JOURNAL

CANADIAN FORM

RECOVERY STOCK-TANK BARRELS PER ACRE FOOT

GEOLOGICAL LEGEND

CRETACEOUS			
V	Viking	TRI	TRIASSIC
FS	Fish Scale	MISS	MISSISSIPPI
C	Cardium		
M	Blairmore		
BR	Belly River	DEVONIAN	
BQ	Basal Quartz	D-2	D-2
BC	Basal Colorado	D-3	D-3
LC	Lower Cret.	C. Lk	Cooking Lake

Data from various sources. Comparison primarily intended to show magnitude of reco... for the various oil producing formations and not as a comparison of reserv...

BELLSHILL LAKE BL. 328 | WIZARD LAKE D-3 319 | GILBERT LC 304 | PEMBINA (WATER INJ.) C 300 | BONNIE GLEN D-3 285 | GOLDEN SPIKE SO. D-3 263 | ST. ALBERT D-3 | GLEN PARK D-3 | CESSFORD C LC | MALMO LC | WAINRIGHT LC | BARONS F S | JOARCAM V | JOFFRE (WATER INJ.) V | WESTEROSE D-3 | LLOYDMINSTER LC | NEW NORWAY D-2 | ACHESON D-3 | REDWATER D-3 | FENN BIG VALLEY D-2 | GLEN PARK LC | ELLERSLIE LC | LEDUC D-3 | DRUMHELLER D-2 | SUNDRE MISS. | WEST DRUMHELLER D-3 | BENTLEY (WATER INJ.) V | PEMBINA 47-9-10 BR | FENN NO. D-3 | LEGAL V | FAIRYDELL D-3 | NORTH WOODBEND LC | VERMILLION LC | STETTLER OTHER D-3 | PEAVEY LC | DUHAMEL D-3 | STETTLER MAIN D-3 | WHITEMUD LC | HARMATTAN-ELKTON MISS. | GILBY E. (WATER INJ.) V | PEMBINA (GAS INJ.) C | CESSFORD A BC | HAMILTON LAKE V | NEW NORWAY LC | ACHESON E. LC | EXCELSIOR D-2 | DUHAMEL D-2 | BAXTER LAKE LC | BATTLE V | GLENEVIS MISS. | CLIVE D-3 | FAIRYDELL D-2 | WILLESDEN GREEN C | BIG VALLEY D-3 | NAMAO BL. | BONNYVILLE LC | CHAUVIN MAIN LC | MALMO D-3 | WAYNE BQ | ERSKINE D-2 | WEST DEVON LC | PEMBINA 47-7-4 BR

ALBERTA OIL RESERVOIR

RECOVERY STOCK-TANK BARRELS PER ACRE

ULTIMATE RECOVERY RANGE 5,000-136,600 S.T.B./Acre
ALPHABETICAL FIELD LIST

FIELD	RANK	FIELD	RANK	FIELD	RANK
Acheson D-3	8	Fenn Big Valley	11	Redwater	6
Athabasca Oil Sands	7	Glen Park D-3	5	St. Albert	10
Bellshill Lake	14	Golden Spike So. D-3	1	Sturgeon Lake D-3	20
Bonnie Glen	3	Harmattan-Elkton	18	Sturgeon Lake So. D-3	15
Duhamel D-3	16	Leduc D-3	19	Sundre	21
Excelsior D-2	12	Leduc Gilbert LC	23	Turner Valley	13
Fairydell D-3	17	Malmo D-3	25	Wayne	22
		New Norway D-2	9	Westerose	4
		Pembina (Water Inj.) C	24	Wizard Lake D-3	2

GOLDEN SPIKE SO. D-3 136,600 | WIZARD LAKE D-3 102,200 | BONNIE GLEN D-3 62,250 | WESTEROSE D-3 44,000 | GLEN PARK D-3 34,000 | REDWATER D-3 | ATHABASCA OIL SANDS LC | ACHESON D-3 | NEW NORWAY D-2 | ST. ALBERT D-3 | FENN BIG VALLEY D-2 | EXCELSIOR D-2 | TURNER VALLEY MISS. | BELLSHILL LAKE BL. | STURGEON LAKE SO. D-3 | DUHAMEL D-3 | FAIRYDELL D-3 | HARMATTAN-ELKTON MISS. | LEDUC D-3 | STURGEON LAKE D-3 | SUNDRE MISS. | WAYNE BQ | PEMBINA (WATER INJ.) C | LEDUC GILBERT LC | MALMO D-3

ALBERTA OIL RESERVOIRS—IN ORDER OF RANK

RECOVERY STOCK-TANK BARRELS PER ACRE

ULTIMATE RECOVERY RANGE 1,500,-5,000 S.T

FIELD	RANK	FIELD	RANK	FIELD	RANK
Acheson E. LC	30	Clive D-3	16	Glen Park LC	18
Acheson No. D-2	26	Drumheller D-2	10	Glenevis	11
Alliance	37	Duhamel D-2	4	Golden Spike So. D-2	29
Barons	34	Ellerslie	43	Golden Spike Other D-2	31
Battle So.	46	Erskine D-3	15	Golden Spike Other D-3	24
Baxter Lake	39	Ewing Lake D-2	42	Joarcam	35
Bentley (Water Inj.)	36	Fairydell D-2	13	Joffre (Water Inj.)	19
Cessford C	33	Fenn No.	7	Keystone	27

MALMO D-2 | WEST DRUMHELLER D-2 | STETTLER D-2 | DUHAMEL D-2 | WEST DRUMHELLER D-3 | STETTLER MAIN D-3 | FENN NO. D-3 | PEMBINA 47-9-10 BR | STETTLER OTHER D-3 | DRUMHELLER D-2 | GLENEVIS MISS. | NEW NORWAY D-3 | FAIRYDELL D-2 | LLOYDMINSTER LC | ERSKINE D-3 | CLIVE D-3 | MALMO LC | GLEN PARK LC | JOFFRE (WATER INJ.) V | NORTH WOODBEND LC | LEDUC D-2 | LITTLE SMOKY D-3 | PEMBINA (GAS INJ.) C | GOLDEN SPIKE OTHER D-3 | PEMBINA 47-7-4 BR | ACHESON NO. D-2 | KEYSTONE C | WESTWARD HO MISS. | GOLDEN SPIKE SO. D-2 | ACHESJN E. LC | GOLDEN SPIKE OTHER D-2 | WAINWRIGHT LC | CESSFORD C BC | BARONS FS | JOARCAM V

ALBERTA OIL RESERVOIRS—IN ORDER OF RAN

IATION EVALUATOR

Supplement to The Oil and Gas Journal,
Vol. 55, No. 33, August 19, 1957.
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and The Oil and Gas Journal (Tulsa)

ESTIMATED ULTIMATE RECOVERY S.T.B./Acre Ft. ALPHABETICAL FIELD LIST

FIELD	RANK
Acheson D-3	18
Acheson E. LC	45
Acheson No. D-2	107
Acheson No. LC	108
Acheson Other D-2	119
Acheson Other LC	72
Acheson So. LC	113
Acheson W. LC	67
Alhambra BR	93
Alhambra C	99
Alliance	64
Armisie	85
Athabasca Oil Sds.	69
Barons	12
Bashaw	100
Battle	49
Battle No.	87
Battle So.	68
Baxter Lake	48
Bellshill Lake	1
Bentley	81
Bentley (Water Inj.)	27
Big Valley	54
Big Valley No.	91
Bonnie Glen	5
Bonnyville	56
Campbell	97
Cessford A	42
Cessford C	9
Chamberlain	112
Chauvin Main	57
Chauvin So.	102
Clive D-2	103
Clive D-3	51
Drumheller D-2	24
Drumheller LC	78
Duhamel D-2	47
Duhamel D-3	36
Ellerslie	22
Erskine	60
Ewing Lake D-2	104
Ewing Lake D-3	109
Excelsior D-2	46
Excelsior LC	121
Fairydell D-2	52
Fairydell D-3	31
Fairydell LC	95
Fairydell Bon-Accord	89
Fenn	98
Fenn No.	29
Fenn Big Valley	20
Ferrier	116
Gilbert	3
Gilby E.	90
Gilby E. (Water Inj.)	40
Gilby W.	71
Glen Park D-2	82
Glen Park D-3	8
Glen Park LC	21
Glenevis	50
Golden Spike So. D-2	106
Golden Spike So. D-3	6
Golden Spike Other D-2	63
Golden Spike Other D-3	83
Hamilton Lake	43
Harmattan-Elkton	39
Hespero	74
Homeglen-Rimbey	111
Joarcam	13
Joffre	65
Joffre (Water Inj.)	14
Keystone	86
Leduc D-2	110
Leduc D-3	23
Legal	30
Little Smoky	79
Lloydminster	16
Malmo D-2	75
Malmo D-3	58
Malmo LC	10
Medin	114
Namao	55
New Norway D-2	17
New Norway D-3	80
New Norway LC	44
North Woodbend	32
Peavey LC	35
Peavey V	94
Pembina 47-7-4 BR	62
Pembina 47-9-10 BR	28
Pembina 48-6-29 BR	96
Pembina (Gas Inj.) C	41
Pembina (Water Inj.) C	4
Pembina (Soln.) C	73
Redwater	19
Rocky Mtn. House	101
Samson	117
Skaro	115
Spring Coulee	120
St. Albert	7
Stettler D-2	88
Stettler LC	66
Stettler Main D-3	37
Stettler Other D-3	34
Sturgeon Lake D-3	76
Sturgeon Lake So. D-3	77
Sturgeon Lake So. Tri	84
Sundre	25
Turner Valley	92
Vermillion	33
Wainwright	11
Wayne	59
West Devon	61
West Drumheller D-2	70
West Drumheller D-3	26
Westerose	15
Westward Ho	105
Whitemud	38
Willesden Green	53
Wizard Lake D-3	2
Wizard Lake LC	118

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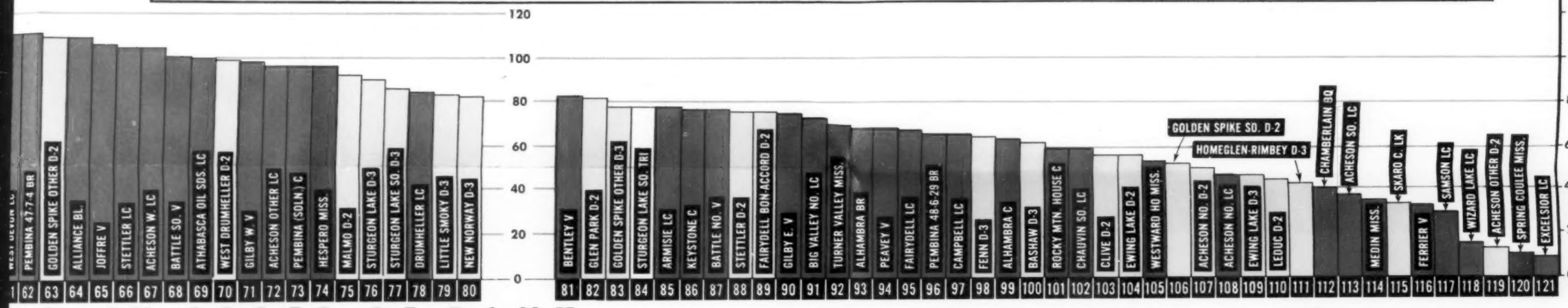


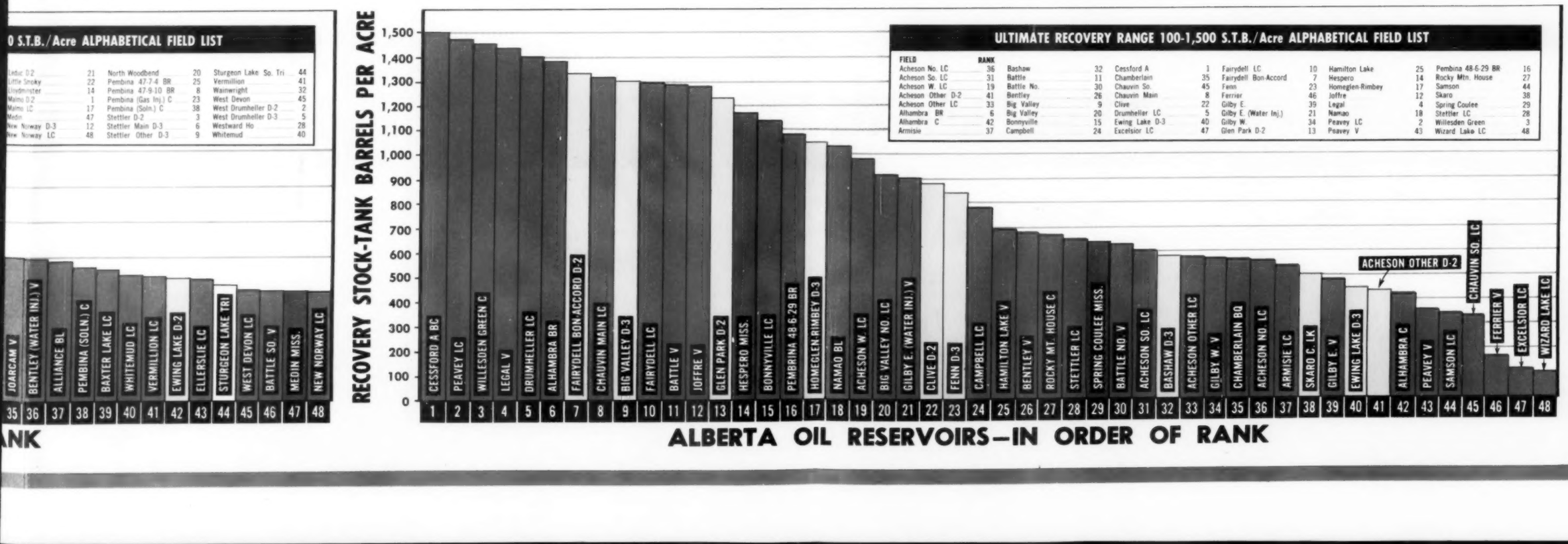
RS—IN ORDER OF RANK

0 S.T.B./Acre ALPHABETICAL FIELD LIST

Leduc D-2	21	North Woodbend	20	Sturgeon Lake So. Tri	44
Little Smoky	22	Pembina 47-7-4 BR	25	Vermillion	41
Lloydminster	14	Pembina 47-9-10 BR	8	Wainwright	32
Malmo D-2	1	Pembina (Gas Inj.) C	23	West Devon	45
Malmo LC	17	Pembina (Soln.) C	38	West Drumheller D-2	2
Medin	47	Stettler D-2	3	West Drumheller D-3	5
New Norway D-3	12	Stettler Main D-3	6	Westward Ho	28
New Norway LC	48	Stettler Other D-3	9	Whitemud	40

ULTIMATE RECOVERY RANGE 100-1,500 S.T.B./Acre ALPHABETICAL FIELD LIST

FIELD	RANK										
Acheson No. LC	36	Bashaw	32	Cessford A	1	Fairydell LC	10	Hamilton Lake	25	Pembina 48-6-29 BR	16
Acheson So. LC	31	Battle	11	Chamberlain	35	Fairydell Bon-Accord	7	Hespero	14	Rocky Mtn. House	27
Acheson W. LC	19	Battle No.	30	Chauvin So.	45	Fenn	23	Homeglen-Rimbey	17	Samson	44
Acheson Other D-2	41	Bentley	26	Chauvin Main	8	Ferrier	46	Joffre	12	Skaro	38
Acheson Other LC	33	Big Valley	9	Clive	22	Gilby E.	39	Legal	4	Spring Coulee	29
Alhambra BR	6	Big Valley	20	Drumheller LC	5	Gilby E. (Water Inj.)	21	Namao	18	Stettler LC	28
Alhambra C	42	Bonnyville	15	Ewing Lake D-3	40	Gilby W.	34	Peavey LC	2	Willesden Green	3
Armisie	37	Campbell	24	Excelsior LC	47	Glen Park D-2	13	Peavey V	43	Wizard Lake LC	48



ALBERTA OIL RESERVOIRS—IN ORDER OF RANK

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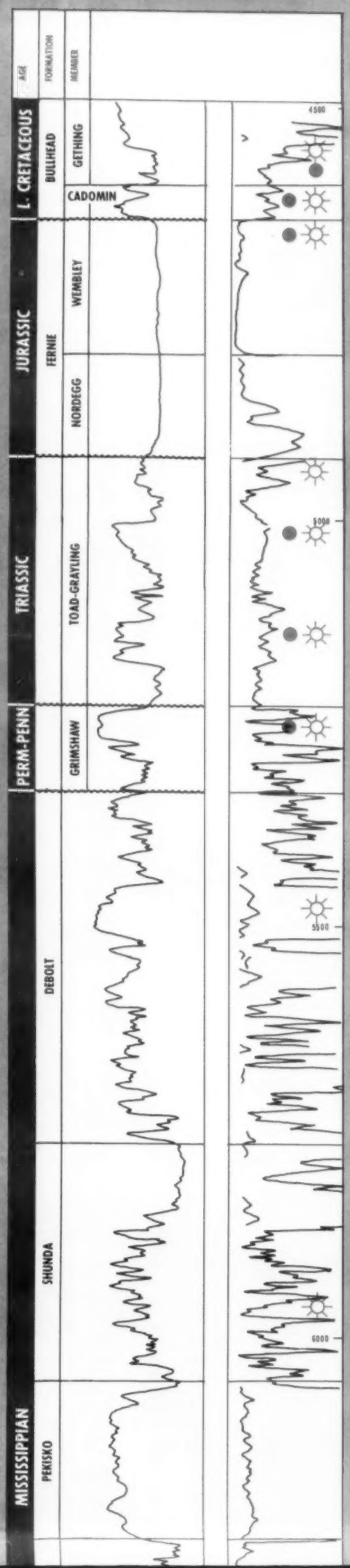
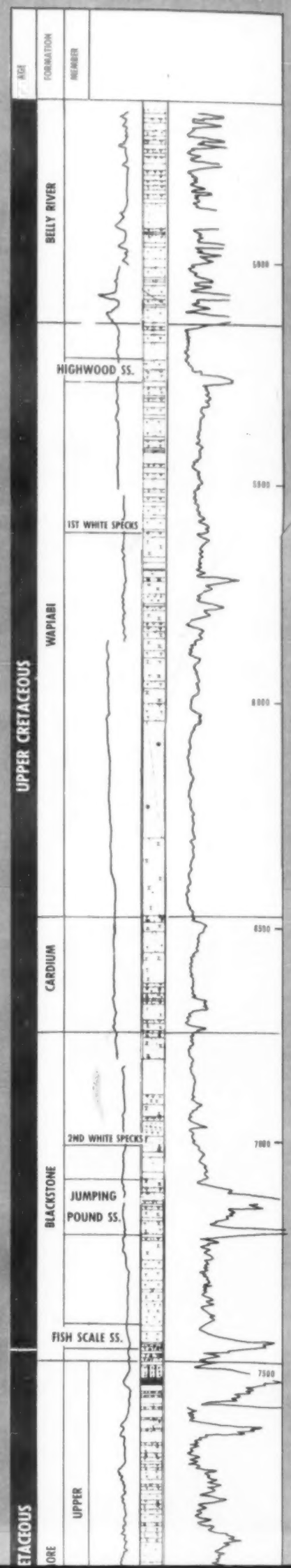
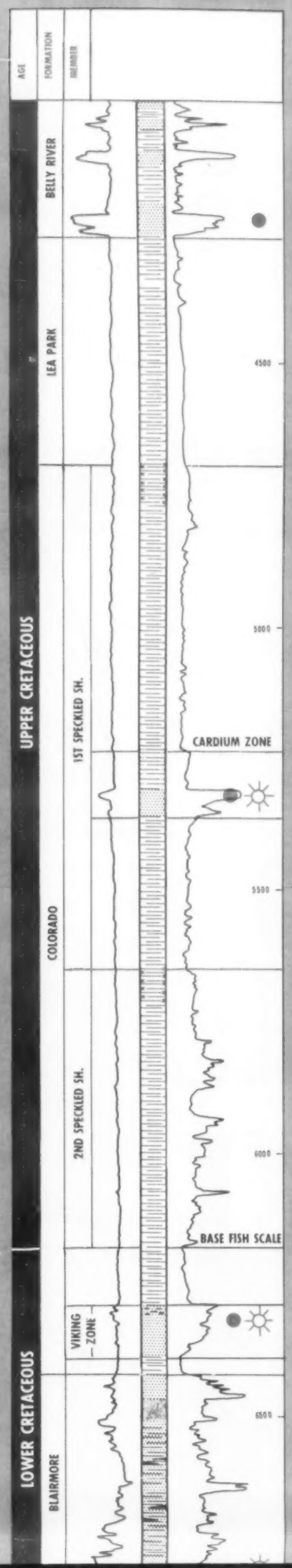
WESTERN PLAINS



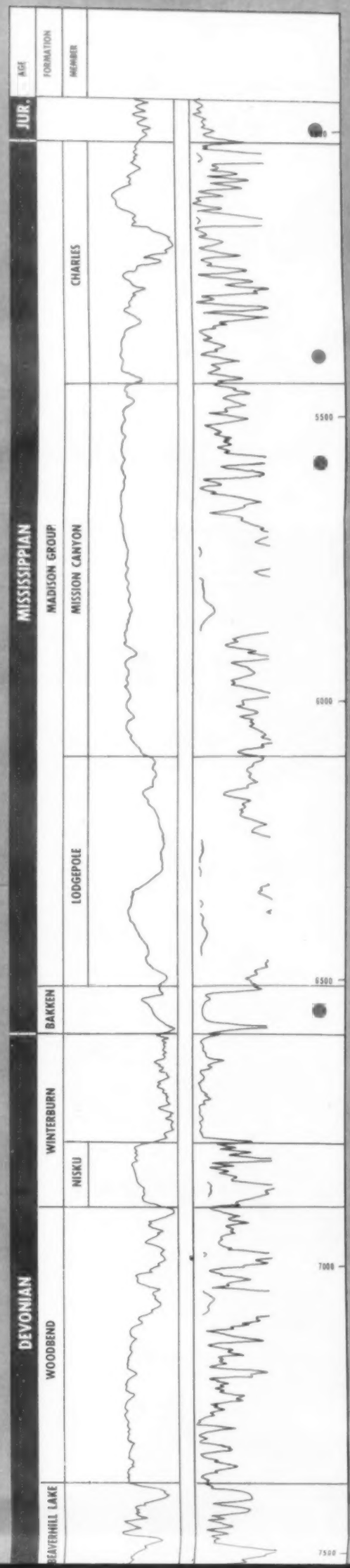
SOUTHERN FOOTHILLS



CENTRAL PLAINS



S.E. SASKATCHEWAN



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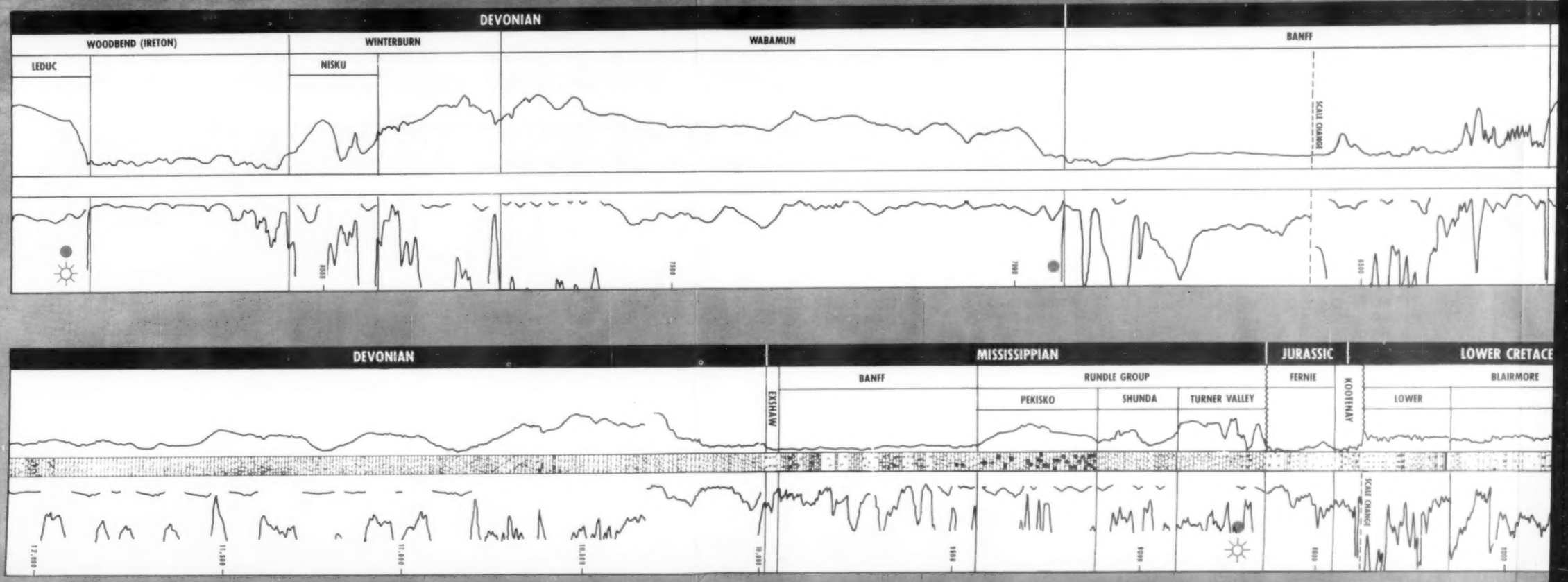
☼ = GAS PRODUCTION



Logs of Western Plains and Southeast Saskatchewan, courtesy of Schlumberger of Canada.

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Using both gelled water and gelled oil as fluid . . .

Canadian Gas Wells Respond To Fracture Treatments

Here's a rundown on the use of the process

By W. M. Thorvaldson

THE use of gelled water as a fracturing fluid is still very much in its infancy in Canada. Only a few such fracturing jobs have been performed, mainly on gas wells. However, these treatments have yielded excellent results. Water also has been used on two disposal or flood wells, with questionable results. It has not been used in a producing oil well to date.

Canadians have regarded with mixed feelings, the introduction of water, gelled or otherwise, into their wells. Although some operators accept it without question, the majority are hesitant to use it. One operator, on being asked of his opinion of putting water and sand into his well, bluntly asked, "Why bother drilling the hole?"

Despite this reluctance to use water, a number of highly successful fracturing treatments have been completed, using gelled water as a fracturing and sand-carrying medium. As a result of this success, the use of gelled water as a fracturing fluid is steadily increasing in gas wells.

Conspicuous success has been attained in gas-well fracturing using gelled acids or gelled diesel oil. However, the fire hazard attending the use of oil, and the high cost of these fluids have led to the introduction of gelled salt or fresh water.

Salt-water disposal . . . The first job of this type was done on a salt-water disposal well. Three thousand gallons of gelled salt water was injected with 10,000 lb. of sand. The job was successful mechanically, but the gel did not break properly. However, gratifying results were obtained after reacidizing the hole. This experience resulted in an extensive study of the mechanics of breaking gels, and it is now certain that the pH of water must be controlled to assure quick breakouts.

The next job was done on the basal quartz gas section. This formation had previously been fractured successfully with gelled naphtha and gelled diesel oil. To avoid fire hazards and to reduce costs, gelled fresh water was tried. Materials used were 21,000 gal. of gelled water and 3,600 lb. of 20-40 mesh sand, pumped at 7 bbl. per minute at a maximum of 1,800 psi., down 2½-in. EUE tubing. The well was capable of making 600 M.c.f. before fracturing and made 6,000 M.c.f. after the fracturing job. The well was shut in for 24 hours after the treatment, and no difficulty was encountered with unbroken gel.

Since then, five more wells have been fractured in this way, using approximately the same quantities of sand and gelled water, and with excellent results. For comparison, these treatments and some gelled oil treatments are tabulated in Table 1. It can be seen that this formation responded readily to fracturing with water, resulting in a saving of approximately

TABLE 3—COMPARATIVE COSTS OF DIFFERENT FRACTURING FLUIDS (20,000 GAL.)

Fluid—	Fluid loss (cc. per 30 min.)	Cost
Gelled diesel oil	25	$5,180
Gelled water	25	2,400
Ungelled water	50	400

TABLE 1—FRACTURING TREATMENTS IN THE BASAL QUARTZ SAND

Well	Fluid	Sand (lb.)	Production	
			Before	After
A	2,100 gal. gelled water	3,600	600 M.c.f.	600 M.c.f.
B	4,000 gal. gelled naphtha	5,000	5.61 M.M.c.f.	32.0 M.M.c.f.
C	2,100 gal. gelled water	4,000	0	30.5 M.M.c.f.
D	1,500 gal. gelled diesel oil	2,500	2.0 M.M.c.f.	11.0 M.M.c.f.
E	2,300 gal. gelled water	4,000	2.4 M.M.c.f.	4.6 M.M.c.f.
F	2,500 gal. gelled diesel oil	2,000	6.2 M.c.f.	6.0 M.M.c.f.
G	5,000 gal. gelled water	5,000	0	14.7 M.M.c.f.

TABLE 2—FRACTURING TREATMENTS IN THE MEDICINE HAT SAND

Well	Fluid	Production	
		Before (M.c.f.)	After (M.c.f.)
H	Gelled water	750 (D.S.T.)	2,500 (7% drawdown)
I	Gelled salt water	500	3,000
J	Gelled diesel oil	3,100	14,000
K	Gelled diesel oil	500	1,750

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50 per cent on fracturing fluid costs.

Southern Alberta . . . In the Medicine Hat gas sand in southern Alberta, four wells have been fractured using gelled water. Three of the wells responded favorably, while the other was neither helped nor harmed. Because this is a rather shaly sand, it is thought that, in the case of the fourth well, the fracturing fluid entered a shale plane not connected with the main reservoir. A typical treatment in this area consists of 10,000 lb. of 20-40 sand in 5,000 gal. of gelled water, injected at 4-5 bbl. per minute, at approximately 2,000 psi. The average production increase has been 350-500 per cent (Table 2).

Farther north, two wells have been fractured in the Middle Blairmore glauconitic sand. The treatments consisted of 10,000 gal. of gelled fresh water and 10,000 lb. of sand. One well fractured into water, and the other's production was boosted from 800 to 2,500 M.c.f. Through a ¼-in. choke, the flowing pressure has increased from 550 to 950 psi.

Triassic D formation wells in the Fort St. John area have been treated with gelled diesel oil. Because of the high pressures encountered (5,000 to 6,500 psi.) and low injection rates, most of these treatments screened out. Most of these wells are now being treated with ungelled diesel oil containing a fluid-loss agent (fluid loss 25 cc.) at 4,200 psi. and 8 bbl. per minute. Two wells in this area have been fractured with gelled fresh water. These treatments increased production 590 per cent. The gelled water (fluid loss of 17 cc.) was injected at 8 bbl. per minute and 3,500 psi. However, the wells cleaned up slowly because of the high pH of the water used. No screenouts occurred.

Salt content . . . Although there is little or no water in the Triassic D, cores show only 1,500 p.p.m. salt content. However, the salt content of the returned fresh water has been as high as 50,000 p.p.m. This indicates an appreciable solvent action by the water, resulting in improved formation permeability. Swelling tests show that silicate-control additives are not needed. On the basis of these results, it is probable that treatments using ungelled fresh water with a fluid loss agent would be quite successful in this formation.

Additives . . . Suitable additives are available to control such difficulties as emulsions and silicate swelling, so that water can be successfully used in almost any formation. In many areas, the determining factor in deciding whether to use water is relative cost. Where water is plentiful and inexpensive, it is preferred. Where water is scarce, an oil-base fluid is used. Comparative costs of fresh water, gelled water, and gelled diesel oil are shown in Table 3.

As Canadian operators become familiar with the advantages of using water as a fracturing fluid, it is expected that this low-cost fracturing medium will become accepted as widely in Canada as it is in the United States. **End.**

THE AUTHOR

W. M. Thorvaldson is petroleum engineer for Dowell Incorporated at Calgary, Alta., Canada. He received his bachelor of science degree in petroleum engineering from University of Oklahoma in 1948. He assumed his present duties in January 1954. He has been associated with fracturing operations in the Canadian fields and has been closely allied with its growth and development in this area.

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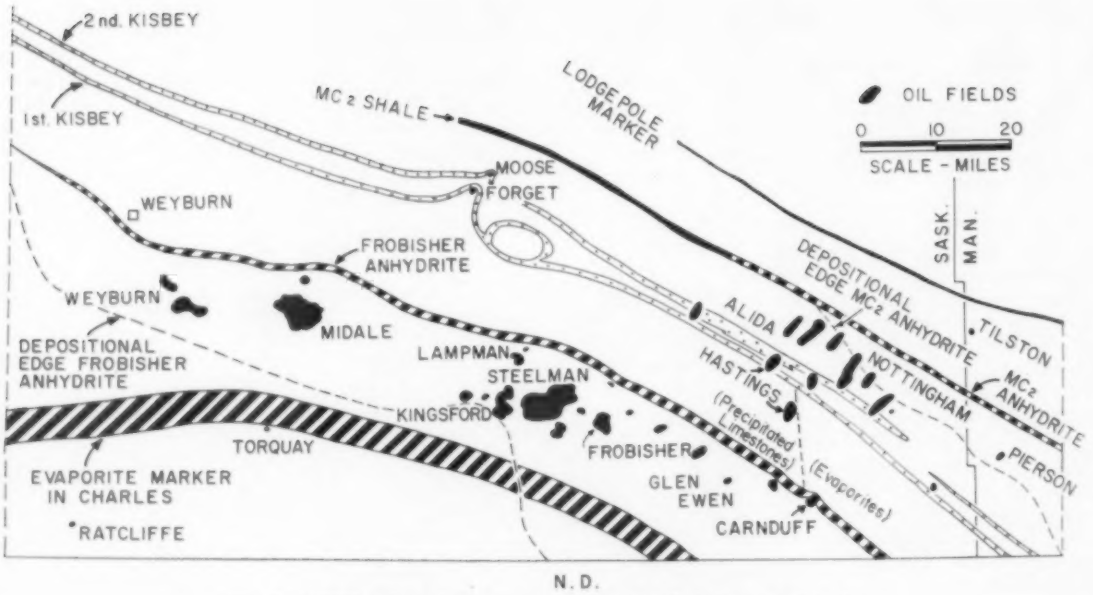

PRE-JURASSIC paleogeologic map of southeastern Saskatchewan. **Fig. 1.**

Half-billion barrels of primary recoverable reserves seen as

Both Structure and Stratigraphy Beckon In S. E. Saskatchewan's Mississippian Fields

By Ralph W. Edie

PRIMARY recoverable reserves now developed in Mississippian strata in southeastern Saskatchewan are estimated by the writer to be 500 million barrels. However, most of the fields are in an early stage of development and ulitmate reserves will undoubtedly be much greater. It is possible that as known trends become fully explored and developed, the primary recoverable reserve figures may be tripled. In addition, as yet undiscovered structural traps and new stratigraphic trends will yield new reserves of oil.

Possibilities

In considering petroleum possibilities in southeastern Saskatchewan, it must be recognized that both structural and stratigraphic traps appear to be present. Traps believed to be largely if not entirely structural include Ratcliffe, Torquay, and the Mission Canyon pools at Frobisher and Midale fields. These traps are not related to the post-Mississippian unconformity surface. They appear to be distributed at random and no evidence is available now to suggest the presence of definite structural trends. It is likely that additional structural trap accumulations of oil will be found that may yield important reserves of oil. The seismograph is the most effective tool for exploration for this type of trap.

Excellent possibilities for stratigraphic accumulation of oil are present both along the Alida-Nottingham, and Midale trends (Fig. 1). Commercial-oil accumulations along the Alida-Nottingham trend appear to depend largely on the presence of topographic ridges on the Mississippian erosion surface and the presence of the underlying MC_2 anhydrite. Seismic methods are extremely useful in delineating the erosional highs and will probably continue to be used in search for this type of trap.

Oil possibilities along the Midale trend appear to be limited by the distribution of permeable limestone facies. The effective method of exploration along this trend is the use of subsurface lithofacies and biofacies techniques as the more permeable limestone types have characteristic textures and associated fossils. The distribution of the various limestone types within the Midale pay zone can be shown on a facies map, and petroleum prospects or extensions of fields may be outlined by extending the facies boundaries into wildcat areas. The seismograph is not considered particularly useful along this trend except possibly at the truncated edge of the Midale member where topography on the Mississippian erosion surface may be an important consideration.

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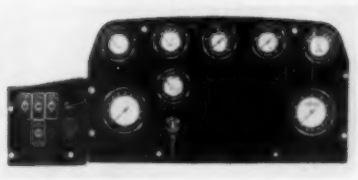

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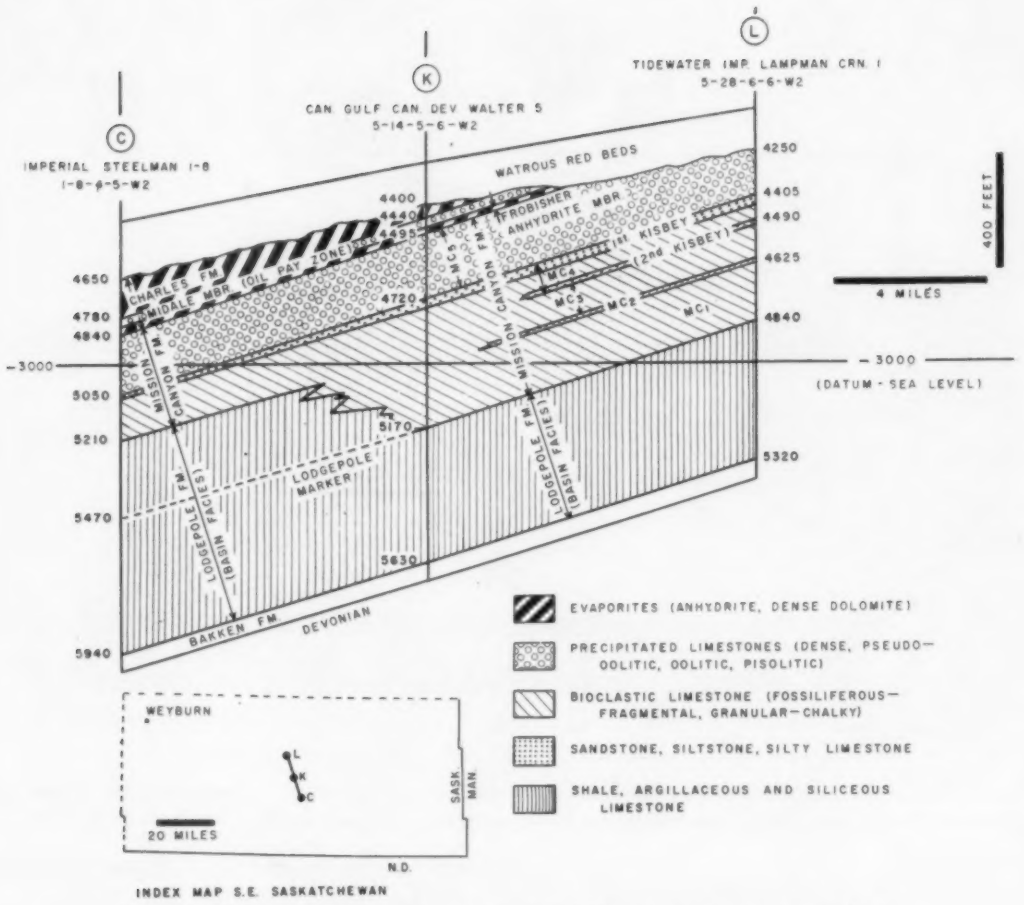


SOUTH-NORTH subsurface section through Lampman field, southeastern Saskatchewan. Fig. 2.

proximal to and down dip from various shaly units including the shale marker at the top of the Lodgepole shelf-facies, the MC_2 shale, and shaly units of the MC_4 Kisbey sandstone beds. These shale units are thin and somewhat brittle (due to their calcareous or dolomitic content) but nevertheless probably form floors to important stratigraphic accumulations of oil.

Theoretically, chalky or dense limestones with very low permeability should also form floors to reservoirs. However the unfavorable factor in southeastern Saskatchewan seems to be the presence of fractures. Examination of cores indicates that open fractures (caused by minor faulting along irregular planes with displacement generally of only a few inches) are common in chalky and dense limestones whereas they are absent or rare in the anhydrite or shaly beds. On the other hand, it is entirely possible that in some areas the chalky limestone beds are not fractured; in this case they may form a suitable floor for commercial oil accumulation.

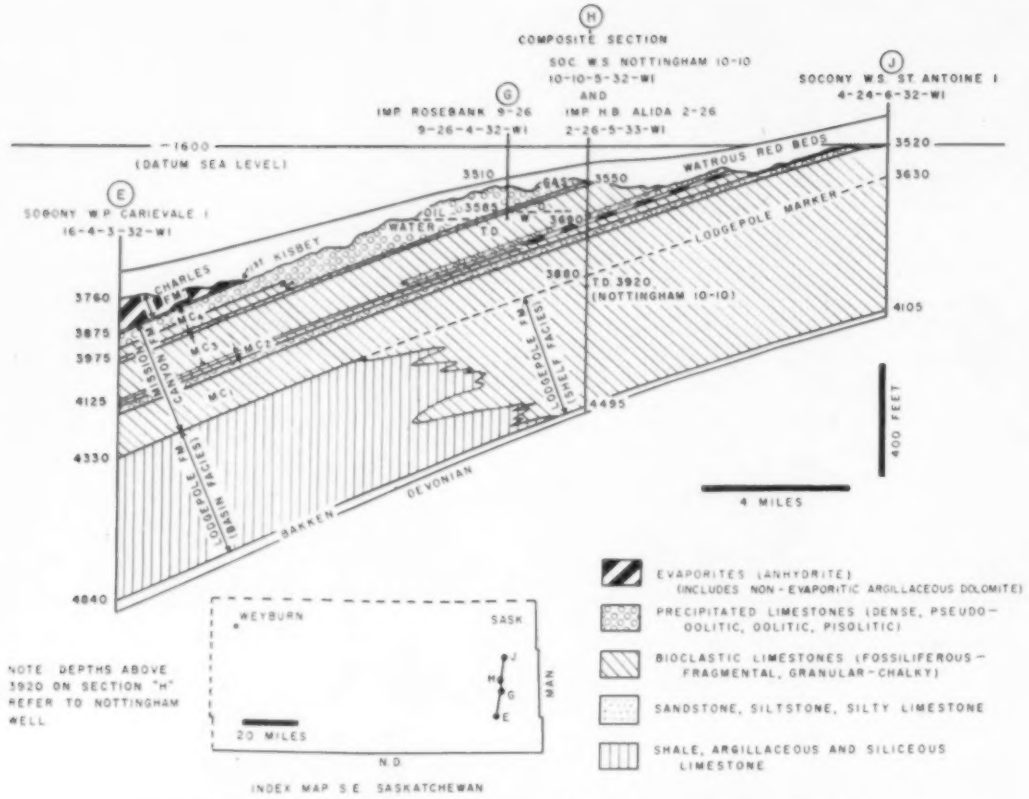
The location of topographically high trends within the Mission Can-

TABLE 1—MISSISSIPPIAN NOMENCLATURE IN SOUTHERN SASKATCHEWAN

Thomas (1954)	Fuller (1956) Edie (this article)	Saskatchewan Geological Society (1956)
Charles formation	Unnamed Charles evaporite	Poplar beds
	Ratcliffe beds	Ratcliffe beds
	Midale evaporite	Ratcliffe beds
Mission Canyon formation:		
	Midale beds	Midale beds
	Frobisher evaporite	Midale beds
MC_5	Hastings-Frobisher beds	Frobisher-Alida beds
MC_4	Kisbey sandstone	Frobisher-Alida beds
MC_3	Forget-Nottingham limestone	Frobisher-Alida beds
MC_2	MC_2 beds	Tilston beds
MC_1	MC_1 limestone	Tilston beds
Lodgepole formation	Lower Madison limestone	Souris Valley beds
Bakken formation	Bakken formation	Bakken formation

THE AUTHOR

Ralph W. Edie is a member of the consulting firm, Andrichuk & Edie, Calgary, Alta. He is a mining engineering graduate of the University of Alberta and received his doctorate in geology from Massachusetts Institute of Technology. Dr. Edie spent 7 years in exploration for gold, copper, and uranium on the Canadian shield. Prior to joining Andrichuk & Edie, he was employed in petroleum exploration for Texaco Exploration and Shell Oil Co. This article was presented in its entirety before the seventh annual meeting, Rocky Mountain Section, A.A.P.G., Salt Lake City, Utah.



SOUTH-NORTH subsurface section through Nottingham field, southeastern Saskatchewan. Fig. 3.

yon may be predicted from detailed lithologic studies of the limestones. For example, the precipitated limestones composed largely of interbedded lithographic and pseudo-oolitic types are relatively resistant to erosion and form a series of erosional highs along the Alida-Nottingham trend (Fig. 3). Similar precipitated limestone sequences and silicified fossiliferous - fragmental limestone beds may be expected to form topographic highs at their erosional edges.

Possibilities of new trends occur in Charles strata stratigraphically above the Midale member. According to detailed correlations by the Saskatchewan Geological Society (1956), the Charles oil-producing limestone units at East Poplar field in northeastern Montana lie stratigraphically higher than the pay zones at Midale and Ratcliffe fields. As shown by Powell (1955), the Charles at East Poplar field is overlain by the Big Snowy group and the oil accumulation there appears to be largely due to structure. The author believes these beds also should contain oil near their subcrop in south-central and southeast-

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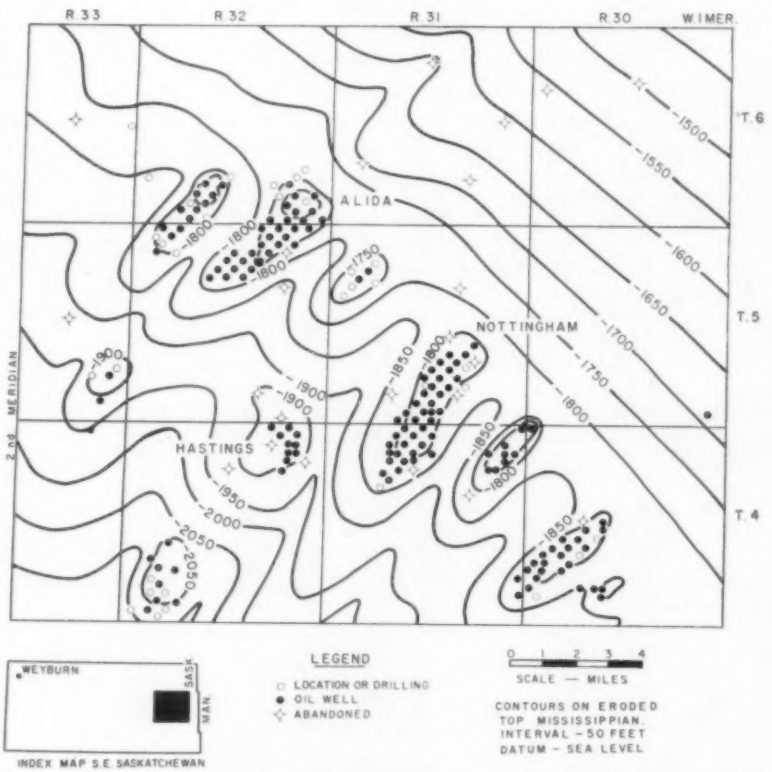

CONTOUR MAP of Mississippian erosion surface, Alida-Nottingham field areas, southeastern Saskatchewan. Fig. 4.

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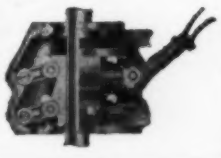

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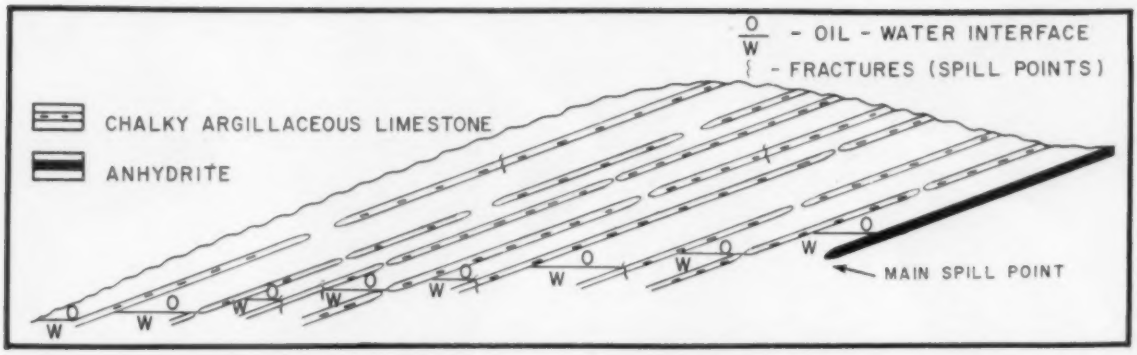


INTERPRETATION of tilted oil-water contact, Nottingham field, southeastern Saskatchewan. Fig. 5.

ern Saskatchewan downdip from the Midale trend.

The Stratigraphy

In southeastern Saskatchewan, Mississippian strata comprise in ascending order, the Bakken, Lodgepole, Mission Canyon, and Charles formations (Table 1). The sequence consists largely of carbonate rocks with minor associated evaporites in the upper part. The strata dip south and southwest and lie on the northeastern flank of the Williston basin. Within the area of study, Charles and Mission Canyon were progressively truncated to the north and northeast by pre-Jurassic erosion. Stratigraphic oil accumulations occur below the pre-Jurassic unconformity where porous limestone units of the Charles and Mission Canyon have been truncated and sealed.

Details of this stratigraphy have been published by Thomas (1954), Porter (1955), Fuller (1956), and Brennan and Graves (1956) and will be mentioned only briefly here. The stratigraphic succession is shown in the cross-sections (Figs. 2, 3, and 7).

Bakken . . . The Bakken formation consists of two black shale members with an intervening siltstone member. Spores occur abundantly in the lower black shale member and are rare in the upper shale. Greenish-gray silty shales associated with the middle siltstone member commonly contain scattered finely costate brachiopods. The formation has a maximum thickness of approximately 120 ft. and thins northward in Saskatchewan and eastward into Manitoba.

Lodgepole . . . The Lodgepole formation consists of two facies. The basin facies which is typical of the Lodgepole consists largely of thin bedded dark grap, argillaceous and siliceous limestone with dark gray shaly partings. The shelf facies consists in general of cream-white chalky limestone containing scattered crinoid fragments, fenestellid bryozoa and white porcellanous chert. Eastward in Manitoba the shelf facies contains fine textured fossiliferous - fragmental limestone and oolitic limestone.

Mission Canyon . . . The Mission Canyon formation consists of cream-white shelf-type limestones. Numerous facies occur within the formation and distinct rock types present in some areas are absent in others. In the Weyburn - Midale - Steelman-Frobisher areas, the Mission Canyon formation consists of an upper oolitic member (50 to 200 ft. thick) underlain by 200 to 350 ft. of fine textured fossiliferous - fragmental and chalky limestones. South and west of the Weyburn area, the upper oolitic member is not present and the entire Mission Canyon formation consists of interbedded fossiliferous-fragmental and chalky limestone.

In the present paper the Mission Canyon has been subdivided into five members in accordance with Thomas (1954). No new names have been introduced and other names including Midale beds, Frobisher evaporite, and Kisbey sandstone which appear on the

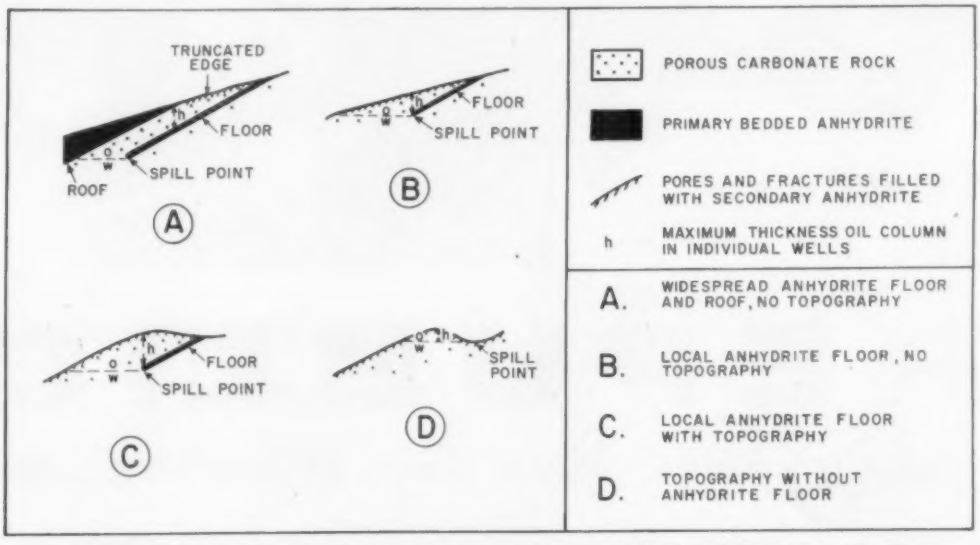
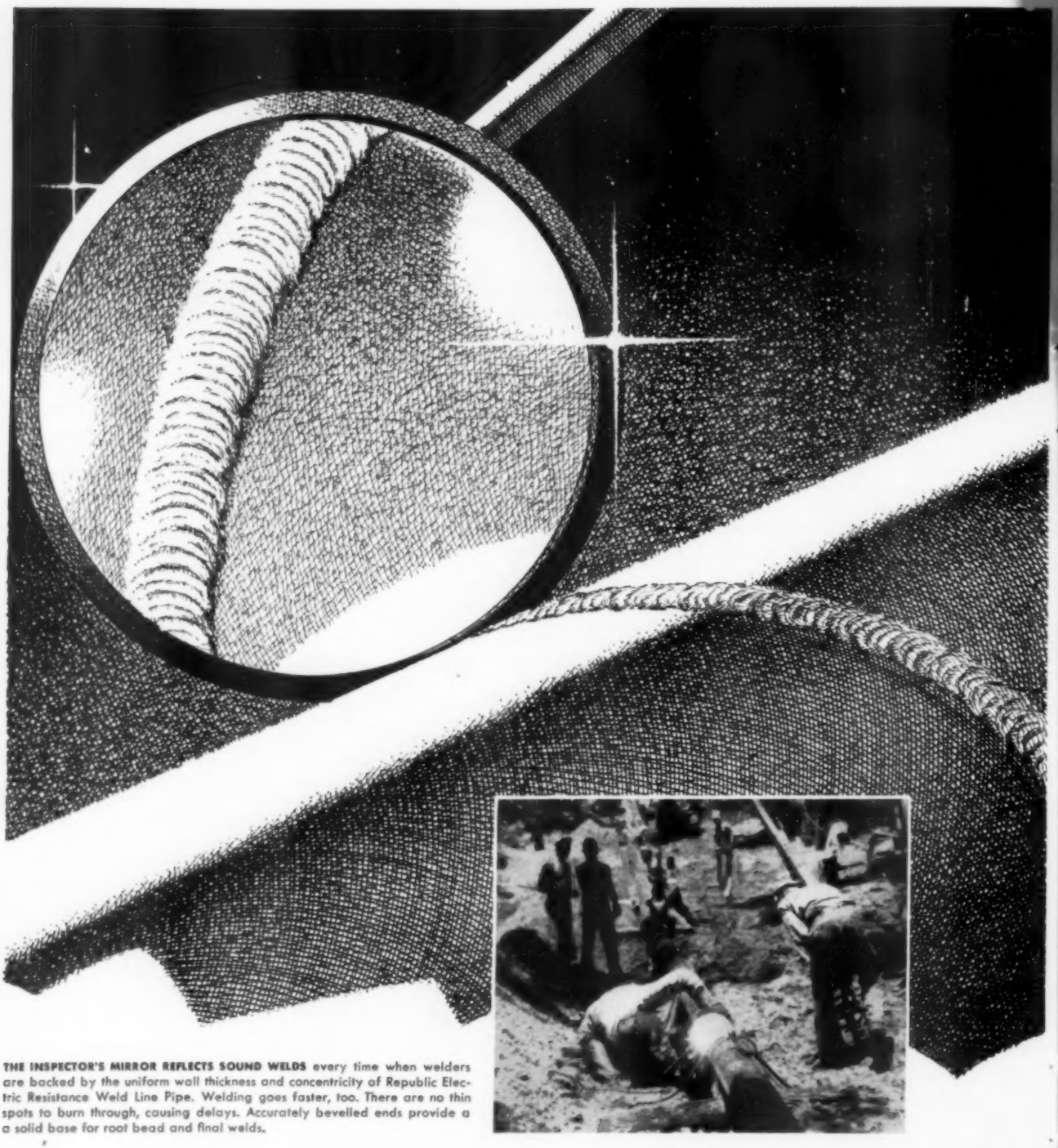


DIAGRAM illustrating factors that affect oil accumulation in southeastern Saskatchewan. Fig. 6.



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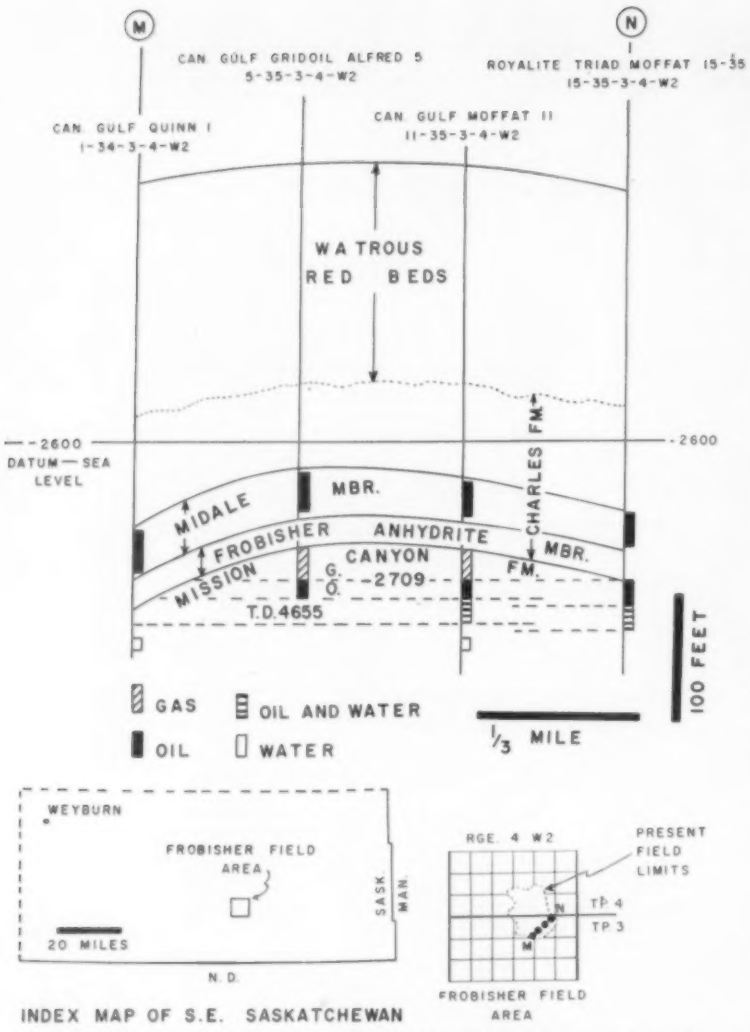

SOUTHWEST-NORTHEAST section through Frobisher field, southeastern Saskatchewan. Fig. 7.

accompanying cross-sections and subcrop map (Figs. 1, 2, 3, and 7) were named by Fuller (1956). In the present study two well defined Kisbey sandstones and equivalent silty secondary dolomite units are recognized. These are labeled First and Second Kisbey sandstones on the accompanying diagrams.

Charles . . . The Charles formation consists largely of an evaporitic sequence including anhydrite, evaporitic dolomite and minor salt with intercalated bioclastic and precipitated limestones. Thin dolomite shales and earthy textured argillaceous dolomites are also present.

The Mission Canyon - Charles boundary is arbitrarily placed at the base of the lowest anhydrite. However, as demonstrated by Porter (1955) and Fuller (1956), the anhydrite beds occur progressively lower in the stratigraphic section toward the basin margin. Thus, identical beds referred to as Charles in one area may be called Mission Canyon in another area, depending on the presence of an extra underlying anhydrite bed. Because of this diachronous formation boundary, in using the terms Charles and Mission Canyon it becomes necessary to refer to the specific area in which the terms are used.

To counteract the confusion in Charles - Mission Canyon nomenclature from one area to another, Fuller (1956) recommended the use of names such as Frobisher evaporite for beds which have a specific stratigraphic position but limited areal distribution. These beds are believed to be essentially time-stratigraphic units and form useful markers for detailed correlation. Under this scheme the terms Charles and Mission Canyon which refer essentially to rock-stratigraphic units would gradually come into disuse. Recently the Names and Correlations Committee of the Saskatchewan Geological Society (1956) proposed a revised set of names. The present status of Mississippian nomenclature is shown in Table 1.

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The Oil Fields

With the exception of oil occurrences at Ratcliffe and Torquay and the Mission Canyon pools at Frobisher and Midale fields, all fields shown in Fig. 1 are believed to be stratigraphic traps formed by truncation and sealing of permeable limestone beds. The gravity of oil varies from 28° to 40° A.P.I. In general, the oil fields follow two distinct trends which for purposes of this paper are called the Midale and Alida-Nottingham trends. Fields outlined to date along the Midale trend include Weyburn, Midale, Kingsford, Lampman, Steelman, Frobisher, Glen Ewen, and Carnduff. All of these fields are still in the development stage and a number of these will probably coalesce as drilling continues. Fields present along the Alida trend include Alida, Nottingham and Pierson. The Hastings field lies between these two trends.

Steelman-Lampman fields . . . Fig. 2 illustrates the type of trap found along the Midale trend. The section extends northward from Imperial's Steelman 1-8 (located within the Steelman field) through Canadian Gulf-Canadian Devonian's 5 Walter (located within the Lampman field) to Tidewater-Imperial's 1 Lampman. The pay zone is the Midale member (called Midale Beds by Fuller, 1956) and consists largely of porous pseudo-oolitic and microgranular limestones, partially to completely dolomitized. The Midale member is truncated and sealed a few miles north of the 5 Walter. The seal is formed largely by infilling of pores by anhydrite at the unconformity. In addition, the lower part of the Watrous red-bed section in many places is relatively impermeable and serves as an additional seal. The trap is formed by the sealed truncated surface of the porous Midale member and by the underlying Frobisher anhydrite which forms a floor to the reservoir.

Nottingham field . . . Fig. 3 is a south - north cross - section through Nottingham field. Both Imperial's 9-26 Rosebank and Socony's 10-10

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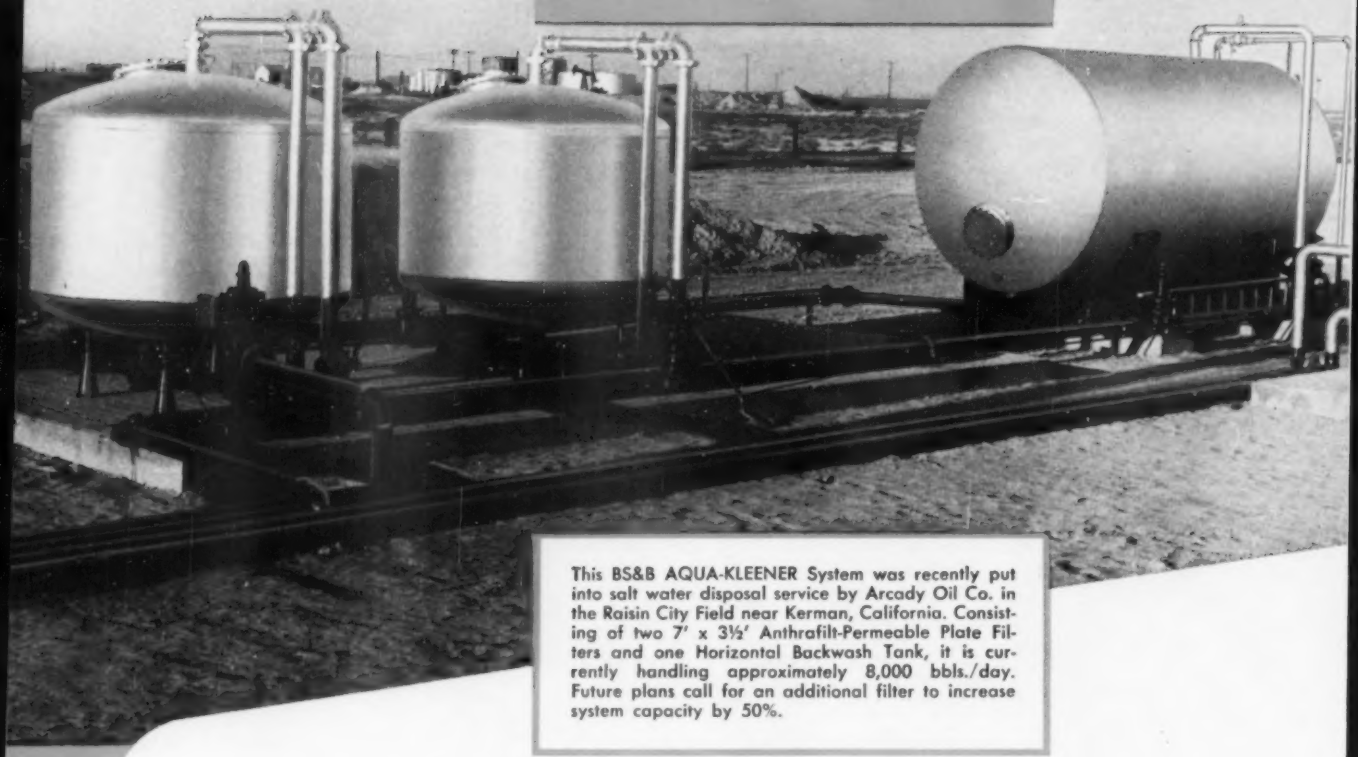

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W. S. Nottingham are within the field limits. The approximate oil-water contact as determined by drill-stem tests and presence of oil staining in cores is shown by a light dashed line. The pay zone consists of porous precipitated and bioclastic limestones (MC_3 and MC_4 members) of the Mission Canyon formation which are truncated updip at the northeast. Considerable topography is present on the Mississippian erosion surface and the topography is reflected in the reduced thickness of the Watrous red beds over topographic highs.

As shown in Fig. 1, the Alida-Nottingham trend lies a few miles downdip from the erosional edge of the MC_2 anhydrite-shale unit. Traps along the southeastern part of this trend are believed to be formed by a combination of topography on the Mississippian erosion surface and presence of the MC_2 anhydrite floor.

As shown by Fig. 4, the Alida-Nottingham trend is characterized by a series of erosional ridges. The axes of individual ridges are aligned in a southwest-northeast direction approximately at right angles to the main producing trend. The map demonstrates the close relationship between oil accumulation and topography on the Mississippian erosion surface.

Development drilling along the Alida - Nottingham trend has shown the presence of thick oil-water transition zones. These transition zones occur at different elevations along the trend and within individual pools occur progressively lower in a downdip direction. Fig. 5 is a diagrammatic interpretation of the fluid relationship at Nottingham field. For illustrative purposes, the oil-water transition zone is shown simply as an oil-water interface.

Study of cores from the pay zone indicates the presence of thin chalky argillaceous limestone beds interstratified with oil-stained permeable limestones. Except where fractured, these chalky units are not oil stained. These units are believed to have been sufficiently impermeable to prevent vertical oil migration except where open fractures are present or where lateral facies changes to more permeable rock types occur.

Because of the highly saline nature of the connate water and the apparent tilt in the opposite direction to the movement of underground waters as suggested by Milner (1956), present day hydrodynamic conditions may be effectively ruled out as a possible cause of the tilt. But, the unusual thickness and slope of the oil-water transition zone appear to be directly related to the presence of chalky limestone beds which behave as permeability barriers. The apparent tilt is interpreted as due to a series of spill points effective at the time of lateral migration of the oil. The main spill point is believed to be formed by the depositional limit of the anhydrite.

Types of stratigraphic traps . . . Fig. 6 illustrates the various factors that control thickness of pay in the area.

. . . Type A is typical of oil fields along the Midale trend. No appreciable topographic relief is present at the erosional edge and the trap is formed by truncation and sealing of a porous limestone unit. The porous unit is overlain by an anhydrite roof and underlain by a fairly extensive anhydrite floor. The maximum thickness of pay "h" depends on the thickness of permeable beds. Within the area where the surface of truncation passes through the reservoir unit a decrease in pay thickness can be expected. The total height of the oil column depends in most cases on the downdip limit of the anhydrite floor.

. . . Type B illustrates the case of uniform truncation associated with a local anhydrite floor. The anhydrite floor behaves as a baffle and prevents oil from migrating updip along the unconformity. This is an extreme case and no such oil fields have been recognized to date.

. . . Type C shows a combination of topography and a local anhydrite floor. The height of the oil column depends on the amount of topography and downdip extent of the anhydrite floor. Examples occur at Nottingham field.

. . . Type D shows a trap formed by topography on the erosion surface without an anhydrite floor. The thickness of oil pay is limited by the amount of closure on the erosion surface. A number of accumulations similar to this diagram are known but none appear to be commercial now.

It should be mentioned that the net thickness of oil pay in individual wells depends on a number of other factors including depth of impregnation of anhydrite below the unconformity, thickness of relatively impermeable beds within the pay zone and thickness and inclination of the oil-water transition zone. Impregnation of beds below the unconformity by secondary anhydrite is not uniform. For example, in some of the wells at Nottingham field, the depth of impregnation is less than 5 ft. along the crests of the erosional ridges and thickens to as much as 35 ft. along the flanks. However, no consistent pattern appears to be present and it is thought that the depth of impregnation depends not only on the topography but also on the original permeability of rocks exposed at the unconformity.

Frobisher field (structural trap) . . . Fig. 7 is a cross-section through Frobisher field. The Mission Canyon pool at this field is believed to be controlled largely if not entirely by structure. In contrast, structure is not considered to be of importance in production from the Midale member; the field area merely represents a local structure superimposed on a huge stratigraphic trap.

The fluid contacts shown in Fig. 7 were obtained from drill-stem-test information. It should be noted that the gas-oil contact at Frobisher field appears to be horizontal whereas the oil-water transition zone appears to slope toward the northeast in an opposite direction to that displayed at Nottingham field (see Figs. 3 and 5).

Bibiography

Brennan, P. F., and Graves, R. R., "Southern Saskatchewan Makes Big Plans," The Oil and Gas Journal, Vol. 54, No. 68, pp. 156-164, August 20, 1956.

Fuller, J. G. C. M., "Mississippian Rocks and Oil Fields in Southeastern Saskatchewan," Sask. Dept. Min. Resources, Rept. No. 19, Regina, 1956.

Milner, R. L., "Effects of Salt Solution in Saskatchewan," paper presented at Williston Basin Symposium, Bismarck, N. D., Oct. 11, 1956, (in press) 1957.

Parker, E. R., "Stratigraphy of Charles Unit in the Midale Field, Saskatchewan," paper presented at Williston Basin Symposium, Bismarck, N. D., Oct. 11, (in press), 1957.

Porter, J. W., "Madison Complex of Southeastern Saskatchewan and Southwestern Manitoba," Jour. Alberta Soc. Petrol. Geol., Vol. 3, (August), pp. 126-130, 1955.

Powell, J. B., "Case History of the East Poplar Field, Roosevelt County, Montana," Geological Record, Rocky Mountain Section Amer. Assoc. Petrol. Geol., Petroleum Information, Denver, Colo., pp. 75-87, 1955.

Saskatchewan Geological Society, "Report of the Mississippian Names and Correlations Committee," 1956.

Thomas, G. E., "The Mississippian of the Northeastern Williston Basin," Trans. Can. Inst. Min. Met., Vol. 57, pp. 68-74, 1954.

Vogt, P. R., "Alida Field, Southwest Saskatchewan," paper presented at Williston Basin Symposium, Bismarck, N. D., Oct. 11, 1956, (in press).

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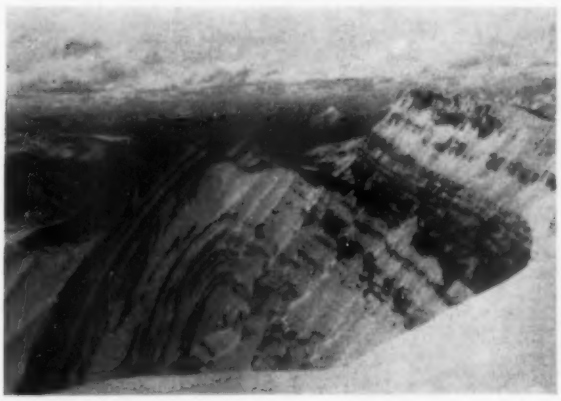

LOOKING INTO a cirque in the same anticline shown in Fig. 1. Fig. 2.

THE BROAD HUMP of a large foothills anticline with moderate dips. Fig. 3.

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By C. Warren Hunt

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Attraction for exploration in the mountains stems basically from the obvious existence of large structures of enormous closure. Exploration has been held up by expense of drilling, uncertainty of structure in the subterrane, and by lack of market for gas which is more abundant than oil. With passage of time each of these factors has decreased as a hindrance to exploration.

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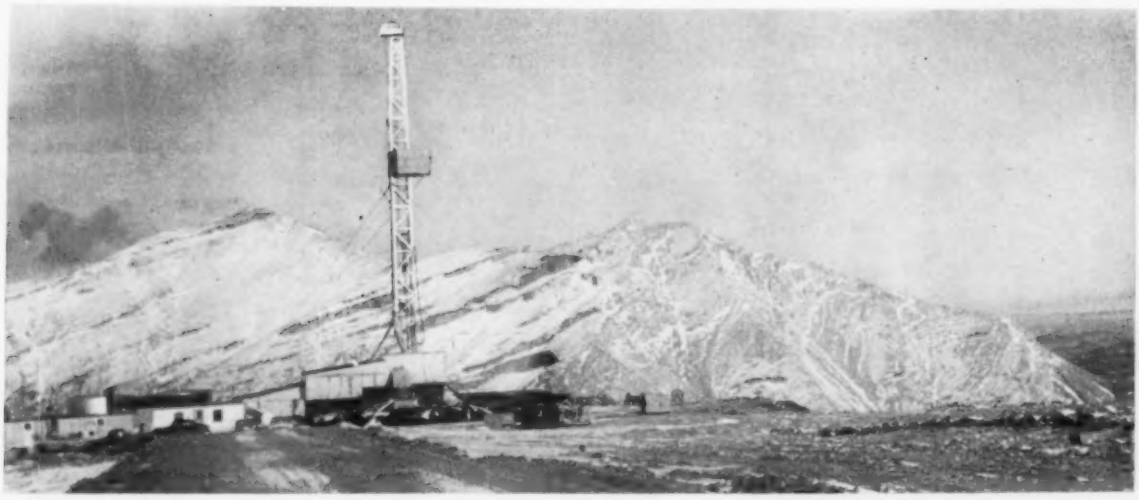

DRILLING IN SAVANNA CREEK field is done at altitudes of 9,900 ft. or more. This rig is Husky Oil & Refining, Ltd., and Phillips Petroleum Co. A-1 Salter. Fig. 4.

Background

When the Savanna Creek anticline was first drilled, the operators were dismayed to find Upper Cretaceous shale below the Mississippian at 140 ft. The outcrop of the thrust fault causing the radical duplication is some 4 miles east. Compounding their ultimate chagrin, they drilled to a depth just short of the second occurrence of Mississippian. There they abandoned, just above a large gas field. A contributing factor to abandoning was the finding of fresh water in sands near total depth. This was thought at the time to indicate probable flushing of the Mississippian reservoir strata below. The important theoretical conclusion which could be drawn from the well, however, had to do with the fault that had been passed. It was a thrust fault, curved, and following approximately the bedding curvature of underlying younger strata.

Over a decade passed after the first abandonment at Savanna Creek. A great deal of money was spent looking for another Turner Valley field. But subsequent mountain and foothills efforts were mainly disappointing. Persistent efforts did not locate a second Turner Valley oil field but led to some very expensive deep dry holes. These were drilled during the war and were followed by the postwar reef play.

The next important step in the mountain play was retarded until 1951. Meanwhile the Pincher Creek and Jumping Pound gas fields, foothills structures of Turner Valley type, had been found by surface geology and seismograph; but they added little of theoretical importance to give impetus to mountain play other than further proof of hydrocarbons and traps.

The 1951 event of importance was the drilling of the Pacific Flathead Valley well on geology of L. M. Clark. It spudded into the Precambrian Lewis thrust sheet west of the Rocky Mountain drainage divide and many miles west of the eroded leading edge of the Lewis. One year later, it reached Mississippian strata beneath the fault at 5,700 ft. The well was dry but showed clearly the potentialities of the strongly overthrust mountain areas.

Success . . . Subsequent events of importance include the deeper drilling and discovery of a major gas field at Savanna Creek. More recently there have been two foothills discoveries which seem to be of importance but on which adequate information is not yet available. These are Shell Waterton Park and Gulf Mountain Park. A host of other prospects are in progress, many in the foothills, some high in the mountains.

And failure . . . In addition to the successes there have been several notable failures. Two wells of major areal importance have recently been abandoned after failing to find their objectives where the seismograph had anticipated them. One of these was east of the mountain front in the

A TRUE mountain wildcat, the Imperial Oil, Ltd., and Canadian Homestead Oils, Ltd., Scalp Creek 9-16, probes the complex subsurface section. Fig. 5.

THE AUTHOR

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SNOWS COME EARLY in the high Rockies and easily obscure outcrops for the field geologist. Fig. 6.

Bow Valley, the other west of it in Crowsnest Pass. They are of interest because they are in the same region as discoveries which also were drilled on seismic features.

To date the seismograph and surface geology can claim about equal merit for rate of discovery. Gravity meter can show some assistance value to both. Even more than with other types of hydrocarbon traps, the mountain prospect requires a method of search adapted locally to topography, evident geology, history of the area, and history of other similar areas.

New techniques needed . . . New techniques and improvement of old ones are needed. As an example of a technique improvement and possibly a contribution to the art of divining amongst the roots of the mountains, here is a method of improving the cross-section. The failure of most cross-sections (and most of them do fail one way or another) is in the failure of the geologist to make a quantitative picture. A great deal of thought goes into three-dimensional thinking and its graphic portrayal. But scarcely a cross-section is quantitatively analyzed in two dimensions, to say nothing of three-dimensional analysis. The result is that cross-section drawing is often done without scientific justification, much in the manner of flower arranging.

Planimetric Equation—A Method for Quantitative Profile Analysis

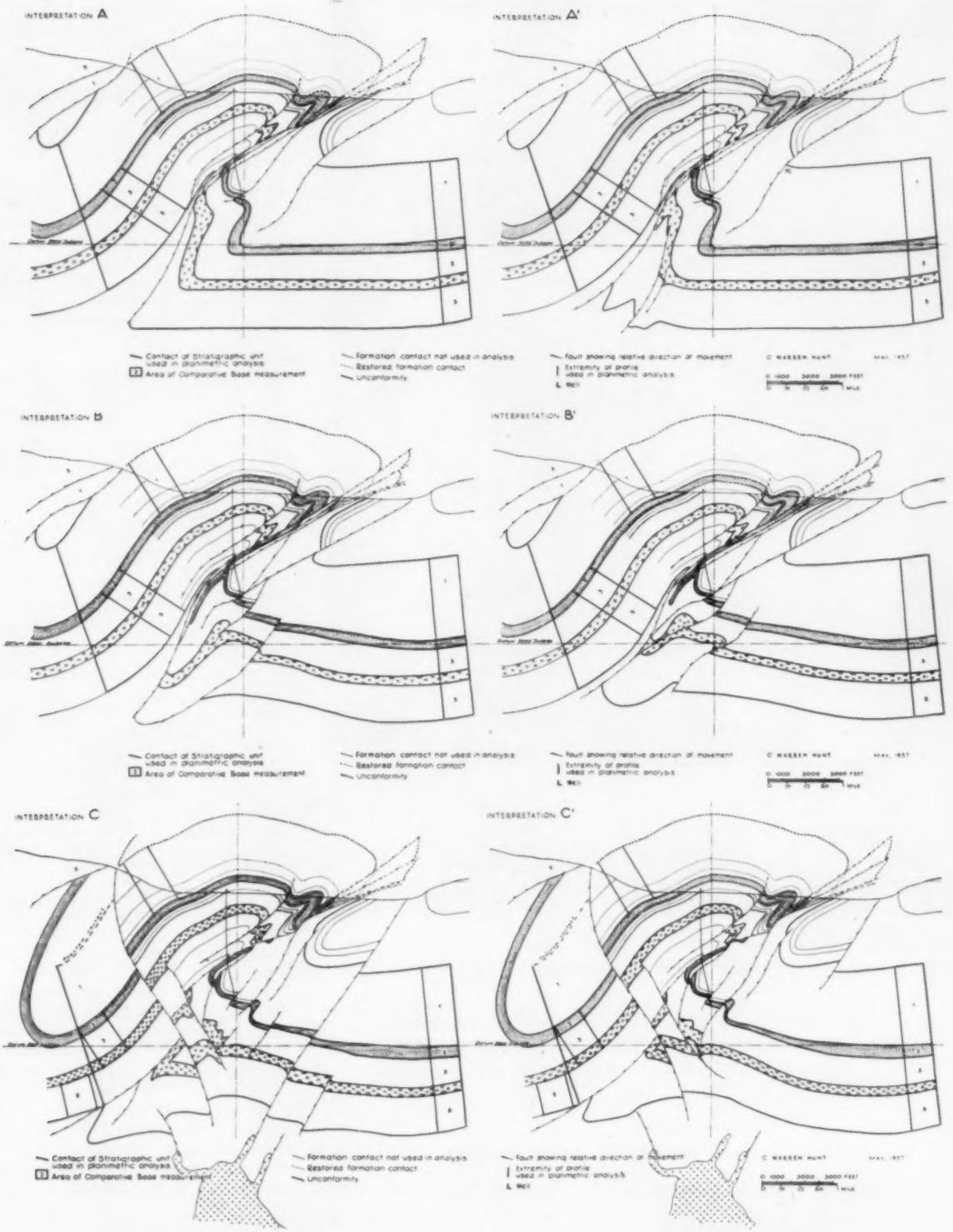
Principle . . . A profile drawn tangential to unidirectional tectonic movement represents an element of rock volume whose areal contribution comprising each stratigraphic unit bears a constant ratio to the sum of contributions of all stratigraphic units represented regardless of geometry of folds or faults whose effects on each such stratigraphic unit are totally represented within the profile extremities.

Assumptions:

1. Appreciable rock volume is neither created nor destroyed by uplift, folding or faulting. Where this

TABLE 1—PLANIMETRIC STATISTICS

Profile	Unit	Area by planimeter	Areal percentile contribution	Per cent: Difference from comparative base	Per cent: Deficiency or excess above or below base	Modified profile	Unit	Area by planimeter	Areal percentile contribution	Per cent: Difference from comparative base	Per cent: Deficiency or excess above or below base
Comparative base	1	1,530	45.85	.....	.....		..	.....	.....	.....	.....
	2	212	6.36	.....	.....		..	.....	.....	.....	.....
	3	579	17.36	.....	.....		..	.....	.....	.....	.....
	4	216	6.48	.....	.....		..	.....	.....	.....	.....
	5	800	23.95	.....	.....		..	.....	.....	.....	.....
Total		3,337	100.00	.....	.....						
A	1	5,095	45.7	−0.1	−2.2	A′	1	5,101	46.0	+0.1	+2.2
	2	679	6.1	−0.3	−4.7		2	654	5.9	−0.5	−7.9
	3	2,092	18.7	+1.3	+7.5		3	1,908	17.2	−0.1	−0.6
	4	730	6.6	+0.1	+1.5		4	736	6.6	+0.1	+1.5
	5	2,550	22.9	−1.0	−4.2		5	2,692	24.3	+0.3	+1.3
Total		11,146	100.0	0.0	.....			11,092	100.0	−0.1	.....
B	1	5,488	46.8	+1.0	+2.2	B′	1	5,482	46.5	+0.6	+1.3
	2	692	5.9	−0.5	−7.9		2	707	6.0	−0.4	−6.3
	3	2,057	17.5	+0.1	+0.6		3	2,039	17.3	−0.06	−0.3
	4	815	6.9	+0.4	+6.2		4	774	6.7	+0.2	+3.1
	5	2,690	22.9	−1.0	−4.2		5	2,784	23.7	−0.3	−1.3
Total		11,742	100.0	0.0	.....			11,786	100.1	0.0	.....
C	1	5,172	44.4	−1.4	−3.0	C′	1	5,149	45.6	−0.2	−0.4
	2	667	5.7	−0.7	−11.0		2	669	5.9	−0.5	−7.9
	3	2,080	17.8	+0.4	+2.3		3	2,028	17.9	+0.5	+2.9
	4	864	7.4	+0.9	+13.9		4	747	6.6	+0.1	+0.2
	5	2,867	24.6	+0.7	+2.9		5	2,707	24.0	0.0	0.0
Total		11,650	99.9	−0.1	.....			11,300	100.0	−0.1	.....



THREE INTERPRETIVE PROFILES, A, B, and C, based on a case from actual field data. Fig. 7.

does not hold true (granitization, etc.) the method is inapplicable unless compensating corrections can be made.

2. Single profile analysis can give only a resolution of tectonic features if the profile plane represents a summation of orogenetic vectors. All orogenetic rock displacement must be parallel to the profile plane, and a rock intersection which is on the profile plane before orogeny will still be on the plane after orogeny.

3. Two undisturbed sequences of the strata to be analyzed must be present at the profile extremities. These sequences may be uplifted and faulted but must be understood as to thickness of various formations with

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respect to others and as to attitude of any formation with respect to another. To put this requirement in other terms, it may be said that an analysis by planimetric equation can only be made between two normal stratigraphic sections.

Procedure:

1. Choose profile position. Choose a line of cross-section so as to meet the assumptions listed above for planimetric analysis. Construct several profiles using different possible historical concepts. Incorporate basic geologic principles and local habits of structure and stratigraphy in all sections and draw with all possible care for detail.

2. Choose stratigraphic units. Divide the stratigraphic column into stratigraphic units of lithologic resemblance. Such units ordinarily may be expected to have behaved uniformly to tectonic forces. For example, a shale sequence of moderate thickness may be considered all one unit irrespective of time breaks within it.

3. Choose profile extremities. Draw profile extremities perpendicular to bedding at each end of the section to be analyzed.

4. Measure comparative base contributions. Using a planimeter, measure the percentile contribution to the stratigraphic column of each stratigraphic unit in each of the two normal zones at the profile extremities. Average these to determine an average comparative base percentile contribution for each stratigraphic unit.

5. Measure total profile contributions. Analysis of planimetric equation is the calculation of the excess or deficiency of areal contribution by all stratigraphic units contributing to a profile. Measure with planimeter the areal contribution of all occurrences of each stratigraphic unit between the profile extremities.

6. Compute excess or deficiency. Compute the ratios of percentile contributions of each such contribution to the total of such contributions. Compare the percentages so derived with those for the same stratigraphic units in the comparative-base measurements. The percentage deviation of these above or below comparative-base percentages is the excess or deficiency in which the formation occurs on the profile.

7. Redraw and adjust. By inspection the cause of excess or deficiency may be evident. A second profile is then drawn so as to eliminate excess or deficiencies. In complex areas the source of excess or deficiency may be hard to find, and may require much study, introduction of new ideas, and the drawing of several intermediate

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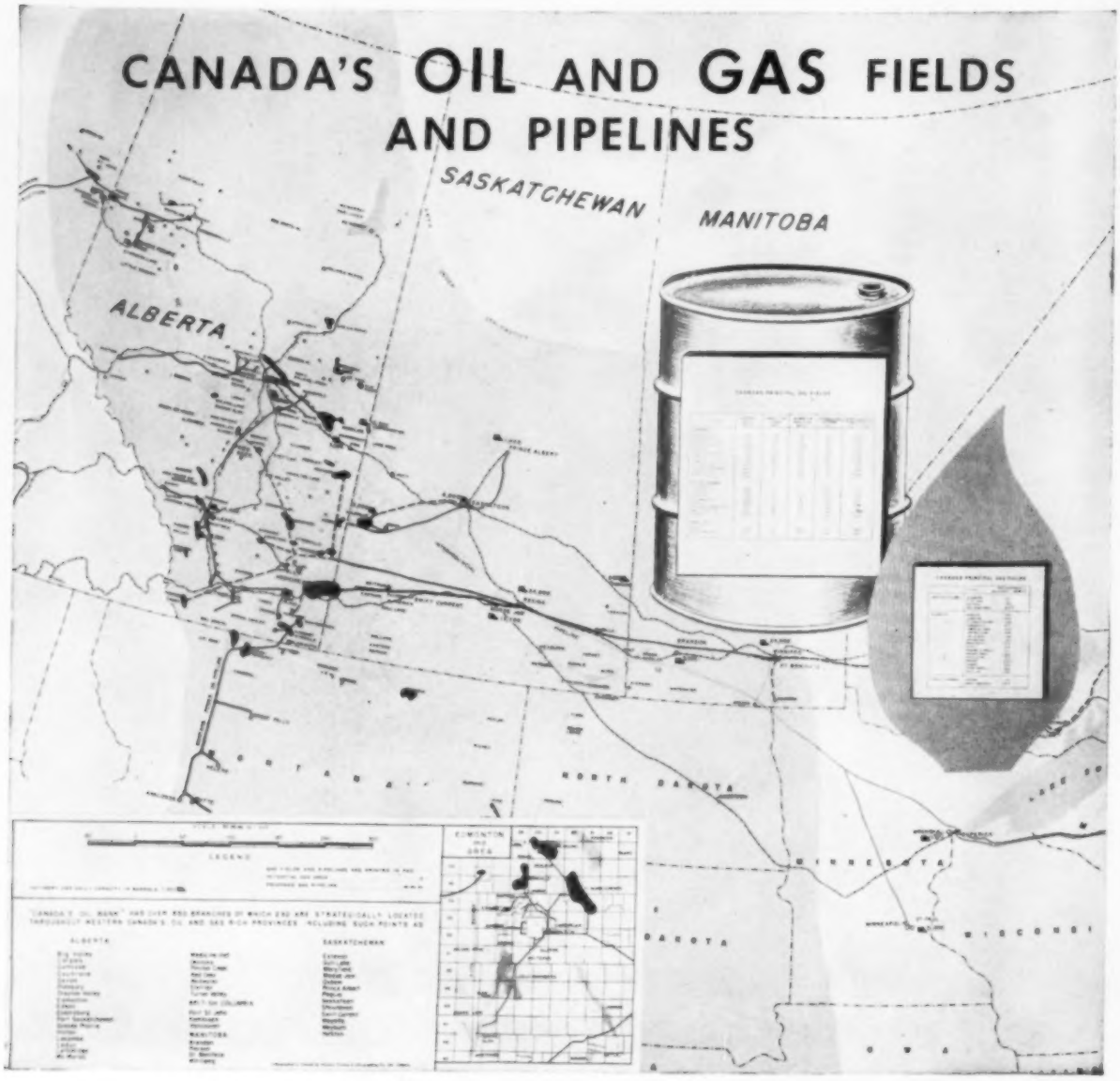

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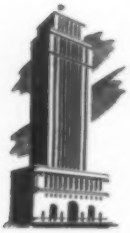

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profiles before a satisfactory improved profile without excess or deficiency is achieved.

8. Errors. These are introduced through (a) thickening or thinning nonlinear between profile extremities (indeterminable), (b) observational error in field or office work (about 2 per cent), (c) differential unpredictable tectonic compaction (indeterminable).

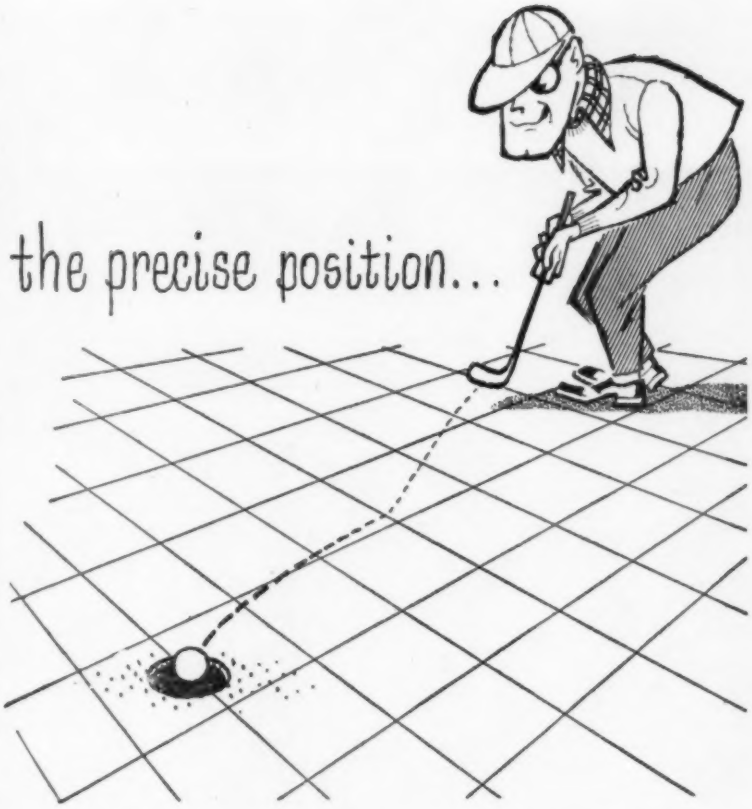
Example . . . Taking a case from actual field data on an area in the Canadian Rockies, three interpretive profiles, A, B, and C, were drawn using the same surface data (Fig. 7). Section A is based on a structural origin or horizontal compression. Section C is based on intrusion and doming following earlier overthrusting. Section B is based on contemporaneous intrusion and horizontal compression.

The stratigraphic section has been divided into (1), a hard sandstone-shale sequence, (2) a mobile shale, (3) a limestone sequence, (4) a calcareous shale, and (5) a massive carbonate sequence.

Planimetric statistics for the three profiles are presented in Table 1 along with calculations of excess or deficiency in terms of per cent of analyzed stratigraphic column and of per cent of comparative base size. Observational error may be shown to be less than 3 per cent of proper size of any unit. Allowance is taken for known but quantitatively immeasurable thinning of Unit 2 in the middle of the profile. This condition is a known fact in this particular case and no attempt is made to correct for its resulting apparent deficiency.

Corrected profile interpretations having planimetric equation are drawn from profiles A, B, and C and presented as profiles A′, B′, and C′. Figures demonstrating lack of excess or deficiency are given also in Table 1. It is now necessary for the geologist to decide, based on principle and local habit, which of the three improved profiles is most likely to be right. Such discussion for the case at hand would be irrelevant here, and any one of the three could be justified under certain circumstances.

Profiles resulting from planimetric equation analysis are only a partial solution to the problem of finding the unique, correct profile. In mathematical terms a unique solution must be both necessary and sufficient. Planimetric equation is necessary for correct solution but is not sufficient for unique solution. The remainder of the problem depends on which basic geologic origin is correct for the problem at hand—or, more confusing, which combination of originating forces and resultant effects is right.



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FIELD AND RESERVOIR DATA

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Alberta Oil Fields

Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Area (acres)	Thickness	Reservoir Drive *	Wells Capable 1-1-57	Ultimate Recovery MM Bbl.	Cum. Prod. M. Bbl. 1-1-57	Gravity A.P.I.
Acheson:												
North L.C.	1950	53-26w4	L. Cret.	4,100	Comb.	520	12.0	P, C-2, M(N) 5, S-G	2	0.29	79.70	37
South L.C.	1954	52-26w4	L. Cret.	4,100	Comb.	120	16.3	P, S-W	2	0.07	24.46	37
West L.C.	....	.....	L. Cret.	4,100	Comb.	160	9.3	P, M(N) 5, S-W	3	0.16	112.79	37.4
Other L.C.	....	.....	L. Cret.	4,100	Comb.	240	6.0	S, C, S-G	5	0.14	97.88	37
North D-2	1952	53-26w4	Dev. D-2	4,550	Struc.	709	45	W, M(N) 1	9	1.58	656.42	40
Other D-2	1952	52-26w4	Dev. D-2	4,550	Struc.	....	....	.....	1	....	4.33	37
D-3	1950	52-26w4	Dev. D-3	5,250	Reef	3,711	75	P, C-3, M(N) 4	88	60.15	12,767.76	38.4
East L.C.	1953	53-25w4	L. Cret.	4,100	Comb.	200	16	S, S-G	5	0.44	173.52	36.2
Alhambra:												
Belly River	1956	41-6w5	Belly R.	....	Strat.	....	....	S	1	....	2.57	....
Cardium	1954	42-6w5	Cardium	6,350	Strat.	7,840	6.6	S, S-G	11	3.30	202.52	42
Alliance	1951	40-13w4	Blair.	3,300	....	240	18	S, S-G	5	0.47	69.65	25.5
Armisie	1951	52-25w4	L. Cret.	3,300	Comb.	1,057	7.0	S, S-G	7	0.58	314.65	38.2
Barons	1950	12-23w4	Fish Sc.	4,100	Strat.	300	8	S(O), M(N)4	6	0.60	218.59	33.9
Bashaw	1951	41-22w4	Dev. D-3	5,650	Reef	480	9	W(G), C-3, M(N) 1	5	0.28	242.52	41
Battle	1953	47-20w4	Viking	3,350	Strat.	520	10	P, M(N) 4, S-W	13	0.67	371.19	36
Battle, North	1954	46-20w4	Viking	....	Strat.	160	8	P, S-W	4	0.10	79.16	36
Battle, South	1954	45-20w4	Viking	3,300	Strat.	920	15	P, S-W	14	1.39	320.29	35
Baxter Lake	1951	47-5w4	L. Cret.	2,190	Struc.	160	14	P, S-W	8	0.29	162.64	18
Bellshill Lake	1955	41-12w4	Bsl. Bl.	2,974	Comb.	1,280	31.3	P	22	13.13	227.38	28
Bentley	1956	40-1w5	Viking	5,724	Strat.	4,480	8	S	41	2.96	316.83	40
Bonnie Glen	1952	47-27w4	Dev. D-3	6,900	Reef	5,480	21.9	P and G, C-2, M(N) 4	149	341.70	32,311.81	42.1
Bonnyville	1951	60-5w4	Colony	....	Comb.	....	....	.....	....	....	....	14.4
Campbell	1949	54-25w4	L. Cret.	3,700	Comb.	720	12	P, C-1, M(N) 5, S-G	12	0.57	356.07	33.6
Cessford "A"	1952	24-12w4	Bsl. Col.	2,800	Struc.	1,600	10.8	P, C-1, M(N) 5, S-G	28	2.40	794.51	24
Cessford "C"	1953	26-13w4	Bsl. Cret.	3,300	Comb.	160	8	.....	3	0.32	1.05	26
Cessford "D"	1951	25-13w4	Bsl. Cret.	3,360	Comb.	....	....	.....	....	....	....	....
Chamberlain	1951	52-23w4	Bsl. Qtz.	3,700	Comb.	160	14	P, C-3, S-W	3	0.09	83.82	25.4
Chauvin	1952	43-1w4	L. Cret.	1,950	Comb.	1,400	11.5	S, C, S-G	28	1.83	581.43	23
Chauvin, South	1952	42-2w4	L. Cret.	1,950	Struc.	320	5.8	S, S-G	6	0.11	38.40	20.2
Clive D-2	1951	40-24w4	Dev. D-2	6,350	Comb.	1,055	15.6	W, C-2, M(N) 1, S-G	6	0.93	164.14	41.3
Clive D-3	1951	40-24w4	Dev. D-3	6,350	Reef	1,000	27	W, C-3, M(N) 1	12	3.35	759.78	40.2
Del Bonita	1932	1-20w4	Rundle	5,131	Struc.	....	....	.....	....	....	....	37
Drumheller:												
L. Cret.	1950	29-20w4	L. Cret.	4,462	Comb.	....	15	P, C, M(N) 5, S-W	4	....	30.03	31.5
North D-2	1951	29-19w4	Dev. D-2	5,250	Struc.	503	16.9	W, M(N) 1	13	4.35	1,306.84	33.2
South D-2	....	.....	Dev. D-2	....	Struc.	598	21.9	.....	....	.....	.....	....
Duhamel:												
D-2	1951	48-21w4	Dev. D-2	4,500	Struc.	800	35	W, C-3, M(N) 1	16	3.71	1,374.81	36.6
D-3	1950	48-21w4	Dev. D-3	4,900	Reef.	560	56	P(G), C-3, M(N) 4	12	4.71	1,528.47	36.2
Ellerslie	1950	51-24w4	L. Cret.	4,100	Comb.	300	8	P, C, M(N) 5, S-W	6	0.51	224.71	29.9
Erskine	1953	39-21w4	Dev. D-3	5,250	Reef	3,987	31.4	W, C-3, M(N) 3	80	13.86	1,923.74	28.2
Ewing Lake D-2	1953	37-21w4	Dev. D-2	5,340	Struc.	315	30	W, M(N) 2, S-W	3	0.54	88.48	31.6
Ewing Lake D-3	1953	37-21w4	Dev. D-3	5,510	Reef	160	9.6	P	1	0.07	53.19	31
Excelsior	1950	56-24w4	L. Cret.	3,493	Comb.	....	14	P, C	1	....	3.19	23.7
Excelsior D-2	1949	56-24w4	Dev. D-2	4,100	Struc.	1,670	80.5	W, M(N) 1	33	17.69	6,323.91	36.6
Fairydell-Bon Accord:												
Bon Accord	1949	56-23w4	Dev. D-2	3,700	Struc.	600	17.6	W, M(N) 3, S-W	11	0.80	535.67	36.4
Fairydell D-2	1953	57-24w4	Dev. D-2	3,700	Struc.	400	32	P, M(N) 5	6	1.55	156.87	26.4
Fairydell D-3	1953	57-24w4	Dev. D-3	4,100	Reef	840	47	W, M(N) 1	19	6.88	1,119.68	26.1
Fenn Big Valley:												
Big Valley	1950	35-20w4	Dev. D-2	5,250	Struc.	14,576	54.2	W, C-3, M(N) 3	298	169.25	26,230.99	32.5
Big Valley D-3	1950	35-20w4	Dev. D-3	5,380	Reef	800	11	W, M(N) 1	7	1.04	576.01	27
Big Valley, North	1951	36-20w4	Dev. D-3	5,407	Reef	....	....	W, C, M(N) 2	1	....	39.46	33.4

LEGEND

*S—Solution gas. P—Partial water drive. W—Water. G—Gravity segreg. O—Oil expansion. C—Gas cap.: (1) very large, (2) large, (3) small. M(N)—Natural press. maint., M(G)—gas inj. press. maint., M(W)—water inj. press. maint.: (1) excellent, (2) very good, (3) good, (4) fair, (5) poor. S-G—Inefficient gas sweep. S-W—Inefficient water sweep.

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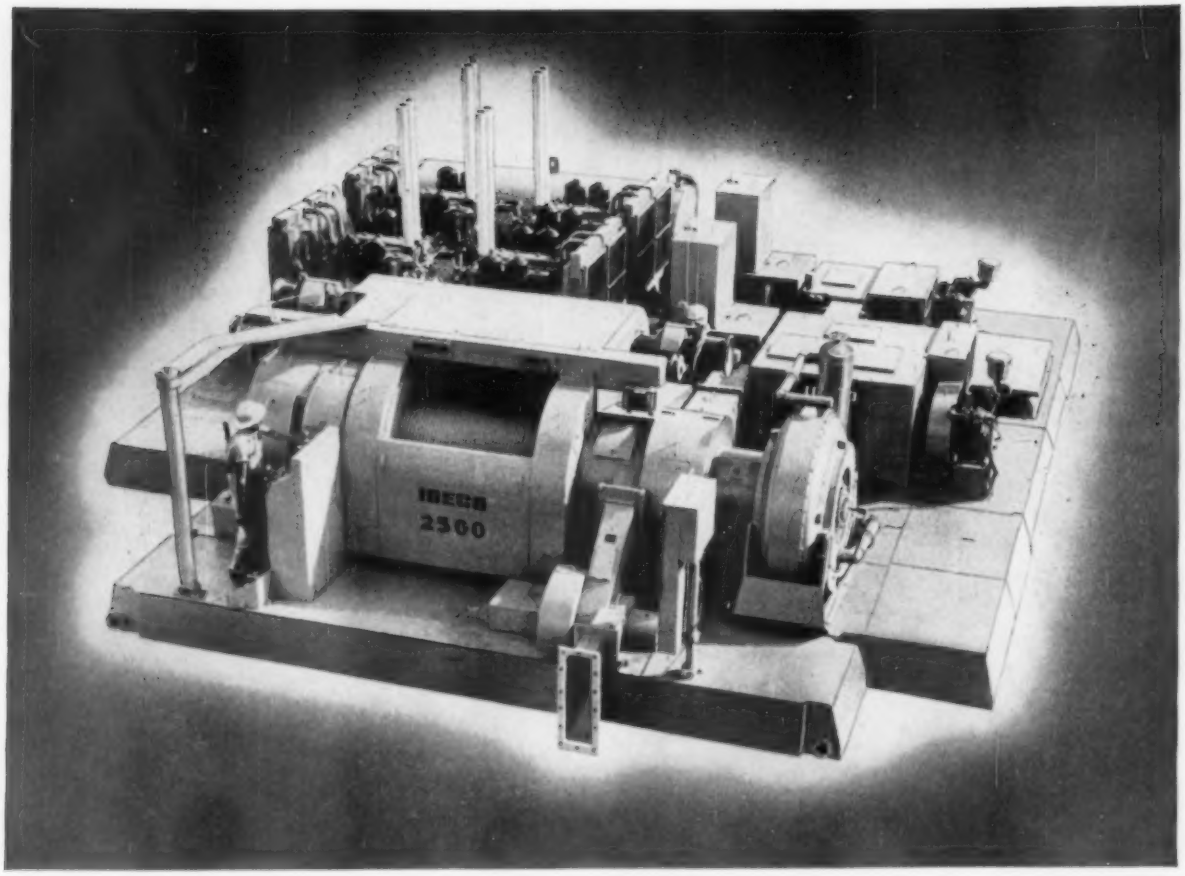

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A JOURNAL TECH-REPORT

FIELD AND RESERVOIR DATA

Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Area (acres)	Thickness	Reservoir Drive*	Wells Capable 1-1-57	Ultimate Recovery MM Bbl.	Cum. Prod. M. Bbl. 1-1-57	Gravity A.P.I.
Fenn D-3	1952	36-20w4	Dev. D-3	5,310	Reef			C	1		17.12	27
Fenn, North, D-3	1954	37-20w4	Dev. D-3	5,250	Reef	1,425	23.7	P, G, C, M(N) 5	23	6.36	496.58	28.5
Gilby, East	1955	41-2w5	Viking	6,000	Strat.	560	6.5	S, O, M(N) 5	5	0.27	128.62	40.2
Gilby, West	1953	41-3w5	Viking	6,400	Strat.	3,840	5.8	S	8	2.19	201.84	39
Glenevis	1951	55-4w4	Miss.	4,500	Struc.	720	31	P, C-3, M(N) 4, S-W	7	2.83	137.44	17.5
Glen Park:												
L. Cret.	1953	49-27w4	L. Cret.	4,500	Comb.	280	15	P, C-3, M(N) 4	3	0.89	110.38	34.5
D-2	1952	49-27w4	Dev. D-2	5,700	Struc.	395	15	W, C-3, M(N) 2	1	0.49	71.00	36.6
D-3	1951	49-27w4	Dev. D-3	6,350	Reef	403	129.5	P, G, M(N) 4	12	13.41	1,928.66	37.8
Golden Spike:												
South D-2	1951	51-27w4	Dev. D-2	4,900	Struc.	440	41	P, C-2, M(N) 4	9	0.96	341.12	39
Other D-2		51-27w4	Dev. D-2	4,900	Struc.	240	20	P, C-3, M(N) 5, S-W	2	0.52	133.52	38.2
South D-3	1949	51-27w4	Dev. D-3	5,700	Reef	1,116	520	G, M(G)	7	152.42	13,967.54	37.2
Other D-3		51-27w4	Dev. D-3	5,700	Reef	240	32	P	5	0.60	236.55	36
Hamilton Lake	1952	35-9w4	Viking	2,850	Strat.	1,500	5	S, C-2, S-G	26	1.03	347.80	30
Harmattan-Elkton	1955	32-4w5	Miss.	9,180	Strat.	8,160	54	P, C	45	62.96	936.60	37
Hespero		32-4w5	Miss.		Strat.	400	12		2	0.23	72.29	
Homeglen-Rimbey	1953	43-1w5	Dev. D-3	8,000	Reef	12,960	25	P, C-1, M(N) 4, S-G	25	13.57	1,237.39	44.7
Joarcam	1949	50-22w4	Viking	3,300	Strat.	22,000	8	P, C-3, M(N) 5	462	43.90	22,538.15	38.2
Joffre	1953	38-25w4	Viking	4,960	Strat.	12,480	12.2	S, O, M(N) 5, S-G	284	16.07	5,889.46	40.6
Keystone		48-4w5	Cardium		Strat.	4,800	29.1		15	10.69	50.71	
Leduc-Woodbend:												
Gilbert L.C.	1948	51-25w4	L. Cret.	4,100	Comb.	480	18	W, C-3, M(N) 2	11	2.63	1,299.59	39.0
N. Woodbend L.C.	1951	51-26w4	L. Cret.	4,100	Comb.	440	17	W, C-3, M(N) 3	9	1.30	625.58	38.0
W. Devon L.C.	1951	50-26w4	L. Cret.	4,100	Comb.	200	14	P, C-3, M(N) 5, S-G	3	0.31	117.46	34.6
Other L.C.			L. Cret.		Comb.	200			4		77.64	38.5
D-2	1947	50-26w4	Dev. D-2	4,900	Struc.	30,000	63	S, P, C-3 (M(N) 5	692	84.13	48,950.31	39.6
D-3	1947	50-26w4	Dev. D-3	5,250	Reef	21,560	35.3	W, C-2 M(N,W,G) 2	535	153.57	91,021.05	40.4
Legal	1952	57-25w4	Viking	2,850	Struc.	280	8	P, C, M(N) 4	7	0.40	243.20	31.0
Little Smoky	1954	67-22w5	Dev. D-3	8,750	Reef	320	31	W, C, M(N) 3, S-W	3	0.84	204.73	40.0
Lloydminster	1939	49-1w4	Sparky	1,918	Comb.			S, C				16.5
Malmo L.C.	1952	44-22w4	L. Cret.	4,500	Comb.	294	13.3	W, C-2, M(N) 3, S-W	9	0.98	350.25	39.0
Malmo D-2	1952	44-22w4	Dev. D-2	4,900	Struc.	1,376	54.9	W, C-3 (M(N) 2	28	7.00	1,910.27	38.5
Malmo D-3	1952	44-22w4	Dev. D-3	5,250	Reef	552	47	P, C-3, M(N) 4	14	2.93	936.44	40.2
Namao	1951	54-25w4	Blair.	3,750	Comb.	640	8.8	S, C-2	16	0.66	278.65	32.7
New Norway:												
L. Cret.	1953	44-22w4	L. Cret.	4,575	Struc.	40	11	C		0.06	1.21	37.9
D-2	1951	44-22w4	Dev. D-2	4,500	Struc.	431	62	W, C-3, M(N) 1	11	6.04	1,361.84	40.0
D-3	1951	45-22w4	Dev. D-3	4,900	Reef	140	47	W, C-3, M(N) 3	6	0.55	393.39	36.0
Peavey:												
Viking	1951	56-24w4	Viking		Comb.	80		S	1		17.82	30
L. Cret.	1952	56-24w4	L. Cret.	3,700	Comb.	360	9.5	S, P, C-2, S-W	9	0.53	213.79	26.5
Pembina:												
Belly River 47-7-4		47-7w5	Belly R.	3,100	Strat.			S	1		16.74	38.8
Belly River 47-9-10	1954	47-9w5	Belly R.		Strat.			S	1		21.19	38
Belly River 48-6-29		48-6w5	Belly R.		Strat.	3,840	16.5	S, C	16	4.17	186.58	38
Cardium	1953	48-8w5	Cardium	5,120	Strat.	383,680		S, M(W)	1,293-325	708.53	52,794.74	37.1
Redwater	1948	57-21w4	Dev. D-3	3,300	Reef	37,536		W, M(N) 5	901	814.01	169,981.10	34.9
Rocky Mtn. House	1954	42-8w5	Cardium	6,400	Strat.	2,400		S	11	1.58	123.25	40.0
St. Albert	1952	54-26w4	Dev. D-3	4,900	Reef	230		W	4	2.97	436.17	34.0
Samson	1953	44-24w4	L. Cret.	4,900	Comb.	200		S, C, S-G	3	0.07	47.15	25.4
Skaro	1951	57-19w4	Ckg. Lk.	3,670	Comb.	160	15	W	4	0.08	19.04	37
Spring Coulee	1950	2-23w4	Rundle	5,000	Struc.	160	59		4	0.10	39.29	33.4
Stettler:												
L. Cret.	1949	39-20w4	L. Cret.	4,240	Comb.	160	6	S	2	0.10	79.80	31.3

LEGEND

*Solution gas. P—Partial water drive. W—Water. G—Gravity segreg. O—Oil expansion. C—Gas cap.: (1) very large, (2) large, (3) small. M(N)—Natural press. maint., M(G)—gas inj. press. maint., M(W)—water inj. press. maint.: (1) excellent, (2) very good, (3) good, (4) fair, (5) poor. S-G—Inefficient gas sweep. S-W—Inefficient water sweep.

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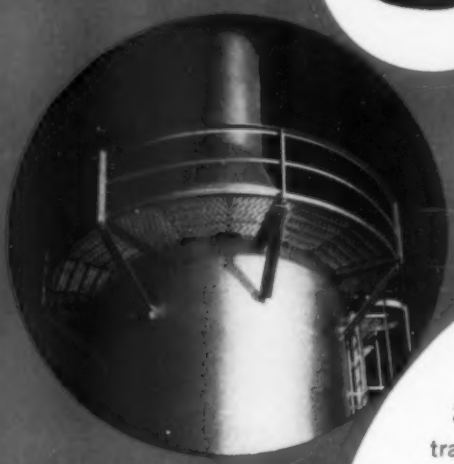

1—Average radiant transfer rate. 2—Maximum deviation from average radiant transfer rate. 3—Average and maximum transfer rate in convection section. 4—Maximum tube wall temperature, radiant or convection. 5—Maximum efficiency with specified excess air. 6—Controlled thermal recirculation of flue gases to provide even heat distribution throughout full length of each tube and equalized heat distribution around each tube. 7—Overload and corresponding transfer load. 8—Design to provide: structural column supports · Ladders · Platforms · Tube Removal facilities, etc. 9—Degree of assembly; of the furnace structure and of the heating surface.

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FIELD AND RESERVOIR DATA

Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Area (acres)	Thickness	Reservoir Drive*	Wells Capable 1-1-57	Ultimate Recovery MM Bbl.	Cum. Prod. M. Bbl. 1-1-57	Gravity A.P.I.
D-2	1949	38-20w4	Dev. D-2	4,900	Struc.	4,413	61.7	P, M(N) 5, S-W	78	20.73	4,873.30	29.7
Main D-3	1949	38-20w4	Dev. D-3	5,250	Reef	2,860	30.8	W, M(N) 2, S-W	29	12.98	1,887.49	27.7
D-3	1949	38-20w4	Dev. D-3	5,250	Reef	210	23.6	W, M(N) 2	2	0.84	112.86	28.0
Sturgeon Lake	1952	71-23w5	Dev. D-3	8,650	Reef	2,400	76	W(G), M(N) 3	19	16.63	562.99	38.4
Sturgeon Lake, S.	1955	69-22w5	Triassic	4,970	Comb.	320	21	S	4	0.52	52.47	37.0
Sturgeon Lake D-3	1953	69-22w5	Dev. D-3	8,480	Reef	11,040	117	P, G, M(N) 5	88	111.42	2,936.48	37.0
Sundre	1955	34-5w5	Miss.	9,200	Strat. (?)	4,740	32.44	P, C-2, M(N) 5	31	29.73	1,082.38	32.1
Turner Valley	1936	18-2w5	Rundle	8,389	Strat.	16,265	156	S, P, C-1, M(W), S-G	302	177.10	111,865.61	37
Wayne	1954	27-20w4	Bsl. Qtz.	4,500	Strat.	800	49	S, C-3	7	4.42	188.76	
W. Drumheller	1952	29-21w4	Dev. D-2	5,250	Struc.	3,802	49	W, C-3, M(N) 1	67	18.52	3,876.48	41
W. Drumheller D-3	1953	30-21w4	Dev. D-3	5,700	Reef	738	23.8	W, M(N) 1	12	3.35	509.57	
Westerose	1952	46-28w4	Dev. D-3	7,050	Reef	1,823	187	P and G, C-2, M(N,G) 4	19	80.26	6,695.58	41.3
Westward Ho	1955	33-4w5	Miss.	8,650	Strat.	2,000	40.84	S	16	4.42	439.99	40.0
Whitemud	1949	51-25w4	L. Cret.	4,100	Comb.	160	12	S, C, S-G	4	0.28	177.37	36.0
Willesden Green		43-6w5	Cardium		Strat.	3,200	12.2		12	4.63	49.65	
Wizard Lake:												
L. Cret.	1952	48-27w4	L. Cret.	4,780	Comb.	40	8		1	0.004	0.61	32.0
D-3	1951	48-27w4	Dev. D-3	6,350	Reef	2,100	319.1	P, G, M(N) 4	51	214.08	17,771.47	35.4

Saskatchewan Oil Fields

Alameda		4-3w2	Charles						17	2.07	27.99	39.0
		4-3w2	Mission C.						4	0.21	2.85	39.6
Alida	1954	5-33w1	Mission C.	3,700	Comb.			Combination	49	22.34	971.28	39.0
Battrum	1955	18-17w3	Roseray	2,880				Water	32	5.35	941.71	19.0
Birling	1949	48-22w3	Sparky	1,840	Strat.			Solution gas	6	0.23		12.0
Bone Creek	1954	10-19w3	U. Shaun.	4,500	Comb.			Solution gas	32	4.08	393.56	24.0
Cantuar	1952	16-17w3	Cantuar	3,200					133	29.92	2,074.89	21.6
			L. Shaun.						1		1.64	
Cantuar, Lower	1952	16-17w3	Roseray	3,325					20	3.84	158.60	20.9
Carnduff	1955	2-33w1	Charles	3,988					35	7.53	144.65	38.0
	1955	2-34w1	Mission C.	4,300					6	0.65	35.99	30.0
Coleville-Smiley:												
Banff	1952	32-24w3	Buff. Coulee	2,700	Comb.			Gas	27	7.30	245.62	13.0
Banff	1951	31-23w3	Coleville	2,700					277	56.63	5,822.77	14.0
Smiley-Dewar	1953	31-25w3	Viking sd.	2,300	Comb.				97	12.48	2,247.32	33.0
Smiley-Dewar	1953	31-25w3	Viking ch.	2,400	Comb.				50	6.42	1,113.33	33.0
Eureka Viking	1954	31-23w3	Viking	2,375					60	5.24	999.71	36-36.5
Other C.S.		30-26w3							2		27.63	29.0
Dollard	1953	7-20w3	U. Shaun.	4,600	Comb.			Water	32	48.66	2,024.65	21.0
Eastend	1952	6-20w3	Shaun.	4,700	Comb.			Solution gas	6	5.90	63.98	21.0
Forget	1953	9-7w2	Mission C.	3,900	Comb.				2		47.18	28.3
Fosterton	1952	17-18w3	Roseray	4,500	Comb.			Solution gas	53	11.60	3,680.47	23.0
Frobisher	1954	3-4w2	Charles	4,600	Strat.			Solution gas	31	8.67	289.53	37.6
	1954	3-4w2	Mission C.	4,650	Struc.			Water	9	2.37	354.46	37.7
Other		4-4w2	Mission C.						5		†4.56	35.0
Gainsborough	1955	2-30w1	Mission C.	3,350					4	0.37	8.33	34.4
Glen Ewen		3-1w2	Charles						8	0.61	17.26	39.0
Gull Lake:												
Johnston bsl.	1953	13-19w3	Cantuar							1.57	73.51	23.0
G. Lk. bsl.			Cantuar						†7		8.47	23.0
Johnston upper	1953	13-19w3	Shaun.						5	0.14	83.22	23.0
North upper	1953	13-19w3	Shaun.						24	4.14	1,083.61	23.0
South	1952	13-19w3	Shaun.						12	0.17	58.32	23.0
S.E. upper Midway	1953	14-19w3	Shaun.						7	0.75	156.63	22.0
S.E. Midway	1953	14-19w3	Cantuar								0.03	21.0
	1953	13-19w3	N. Vanguard						3	1.81	56.85	23.0
Halbrite	1955	6-12w2	Charles	4,720	Comb.			Solution gas	4	13.17	19.37	30.1

LEGEND

*Solution gas. P—Partial water drive. W—Water. G—Gravity segreg. O—Oil expansion. C—Gas cap.: (1) very large, (2) large, (3) small. M(N)—Natural press. maint., M(G)—gas inj. press. maint., M(W)—water inj. press. maint.: (1) excellent, (2) very good, (3) good, (4) fair, (5) poor. S-G—Inefficient gas sweep. S-W—Inefficient water sweep.

†Combined with M.C. north pool.

NOTE: Structure classification for Saskatchewan and Manitoba from The Oil and Gas Journal records.

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Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Area (acres)	Thickness	Reservoir Drive*	Wells Capable 1-1-57	Ultimate Recovery MM Bbl.	Cum. Prod. M. Bbl. 1-1-57	Gravity A.P.I.
Hastings	1955	3-33w1	Mission C.	3,900	.....	.....	....	.....	46	9.02	290.51	39-41
		4-33w1	Charles	....	.....	.....	....	.....	10	1.02	38.44	35.8
Hoosier	1952	31-28w3	Detrital	2,800	Comb.	.....	....	.....	2	.....	50.26	18.0
Instow	1954	9-18w3	U. Shaun.	4,600	Comb.	.....	....	Solution gas	12	3.04	274.21	22-24
Java	1953	15-15w3	Cantuar	3,300	.....	.....	....	.....	5	0.99	13.15	12.5
Kingsford:												
East and West	1955	4-6w2	Charles	4,900	.....	.....	....	.....	64	33.05	683.05	30.0
		4-6w2	Mission C.	....	.....	.....	....	.....	10	1.65	36.38	34.0
Lampman	1954	5-6w2	Charles	4,500	Comb.	.....	....	Solution gas	21	14.62	107.40	35.0
	1955	5-6w2	Mission C.	4,550	Comb.	.....	....	Solution gas	7	0.29	26.89	33.0
Leon Lake	1953	8-19w3	Shaun.	4,500	Comb.	.....	....	Solution gas	5	5.65	42.57	23.0
Lone Rock:												
Epping	1952	47-27w3	Sparky	1,900	.....	.....	....	.....	33	1.56	463.55	15.8
W. Epping		47-28w3	Sparky	....	.....	.....	....	.....	5	.....	31.43	15.6
Lone Rock	1946	47-27w3	Sparky	1,875	.....	.....	....	.....	99	5.00	4,222.23	17.1
Epping	1952	47-27w3	Gen. Pete	1,990	.....	.....	....	.....	21	1.24	384.45	17.0
	1953	47-27w3	Lloydm.	1,980	.....	.....	....	.....	1	0.05	13.45	11.7
Lloydminster:												
Dulwich	1935	48-27w3	Sparky	1,825	.....	.....	....	.....	146	3.37	2,610.01	17.0
Silverdale	1944	49-28w3	Sparky	1,850	.....	.....	....	.....	107	5.00	3,930.17	14.4
Till	1952	50-28w3	Sparky	1,825	.....	.....	....	.....	5	0.17	129.94	8.8
Dulwich	1948	49-27w3	Gen. Pete	1,880	.....	.....	....	.....	5	2.25	174.82	16.3
Silverdale	1945	50-27w3	Gen. Pete	1,900	.....	.....	....	.....	1	0.10	41.77	12.5
Marsden	1949	44-28w3	Sparky, Dina, & Marsden	1,890	Strat.	.....	....	Solution gas	11	0.77	263.39	10.4-14.7
Maidstone	1949	49-23w3	Waseca	1,500	Strat.	.....	....	Solution gas	11	0.08	59.84	13.6
Manor		7-34w1	Mission C.	.....	.....	.....	....	.....	2	0.19	2.87	35.3
Marengo	1953	28-27w3	Detrital	2,950	Comb.	.....	....	.....	1	.....	7.93	18.0
McLaren	1948	50-25w3	McLaren & Waseca	1,750	Strat.	.....	....	Solution gas	21	0.95	317.27	12.2-12.7
Midale	1953	6-10w2	Charles	4,600	Strat.	.....	....	Solution gas	167	69.38	2,122.40	28.0
	1954	6-11w2	Mission C.	4,650	Strat.	.....	....	Solution gas	17	3.77	194.26	28.0
Midway	1952	15-19w3	Jurassic	3,600	.....	.....	....	.....	1	.....	2.47	22.0
Moose	1953	9-6w2	Mission C.	4,000	Comb.	.....	....	Solution gas	2	.....	44.17	30.0
N. Premier	1953	15-18w3	Roseray	....	Comb.	.....	....	Solution gas	7	2.39	82.61	21.8
	1953	15-19w3	U. Shaun.	3,400	Comb.	.....	....	Solution gas	6	0.19	25.65	23.0
Nottingham:												
Ingoldsby	1955	4-31w1	Mission C.	3,950	.....	.....	....	.....	24	8.82	356.26	32.2
Nottingham		4-32w1	Mission C.	....	.....	.....	....	.....	40	23.70	1,226.45	35.3
N. Nottingham	1956	5-32w1	Mission C.	3,650	.....	.....	....	.....	16	13.00	179.73	39.2
Rosebank	1954	4-32w1	Mission C.	3,600	.....	.....	....	.....	4	1.14	53.19	34-36
Other Miss. C.			Mission C.	....	.....	.....	....	.....	3	0.31	13.27	....
Queensdale		6-2w2	Mission C.	....	.....	.....	....	.....	5	.....	6.55	37.3
Rapdan	1953	4-20w3	U. Shaun.	4,600	Comb.	.....	....	.....	4	1.80	101.02	21-23
Ratcliffe	1952	1-15w2	Mission C.	6,500	Comb.	.....	....	.....	2	.....	39.11	31.0
S. Hlerbrun	1954	10-18w4	L. Shaun.	4,570	Comb.	.....	....	.....	.....	.....	0.74	....
Steelman	1955	4-5w2	Charles	4,800	Strat.	.....	....	Solution gas	208	67.42	2,351.84	35-38
		4-5w2	Mission C.	....	.....	.....	....	.....	16	5.15	50.79	37.0
Success:												
N. Roseray	1952	17-16w3	Roseray	3,100	.....	.....	....	.....	38	7.53	1,696.57	22.0
Alpha		17-16w3	Roseray	....	.....	.....	....	.....	33	1.61	284.84	23.0
S. Success		16-16w3	Roseray	....	.....	.....	....	.....	7	8.16	1,496.88	22.0
Torguay		3-11w2	Charles	....	.....	.....	....	.....	2	0.36	13.76	31.0
Verlo	1955	16-19w3	Roseray	3,370	Comb.	.....	....	.....	3	.....	11.59	23.9
Wapella	1952	14-1w2	U. Blair.	2,200	Comb.	.....	....	Combination	1	0.05	33.13	26.0
		14-1w2	Wapella	....	.....	.....	....	.....	8	1.26	419.85	26.0
		14-1w2	Jurassic	2,500	Comb.	.....	....	Combination	16	1.11	414.50	26.0
Waseca	1950	49-24w3	Waseca	1,700	Strat.	.....	....	Solution gas	7	0.26	108.60	12.3
Weyburn	1954	6-13w2	Charles	4,450	.....	.....	....	.....	76	111.25	513.29	33.6
	1954	6-13w2	Mission C.	4,480	Strat.	.....	....	Solution gas	6	2.02	22.05	31.0
Whiteside	1955	30-26w3	Viking	2,490	.....	.....	....	.....	6	0.59	35.53	33.0

LEGEND

*Solution gas. P—Partial water drive. W—Water. G—Gravity segreg. O—Oil expansion. C—Gas cap.: (1) very large, (2) large, (3) small. M(N)—Natural press. maint., M(G)—gas inj. press. maint., M(W)—water inj. press. maint.: (1) excellent, (2) very good, (3) good, (4) fair, (5) poor. S-G—Inefficient gas sweep. S-W—Inefficient water sweep.

‡Gas.

NOTE: Structure classification for Saskatchewan and Manitoba from The Oil and Gas Journal records.

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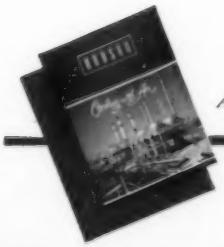

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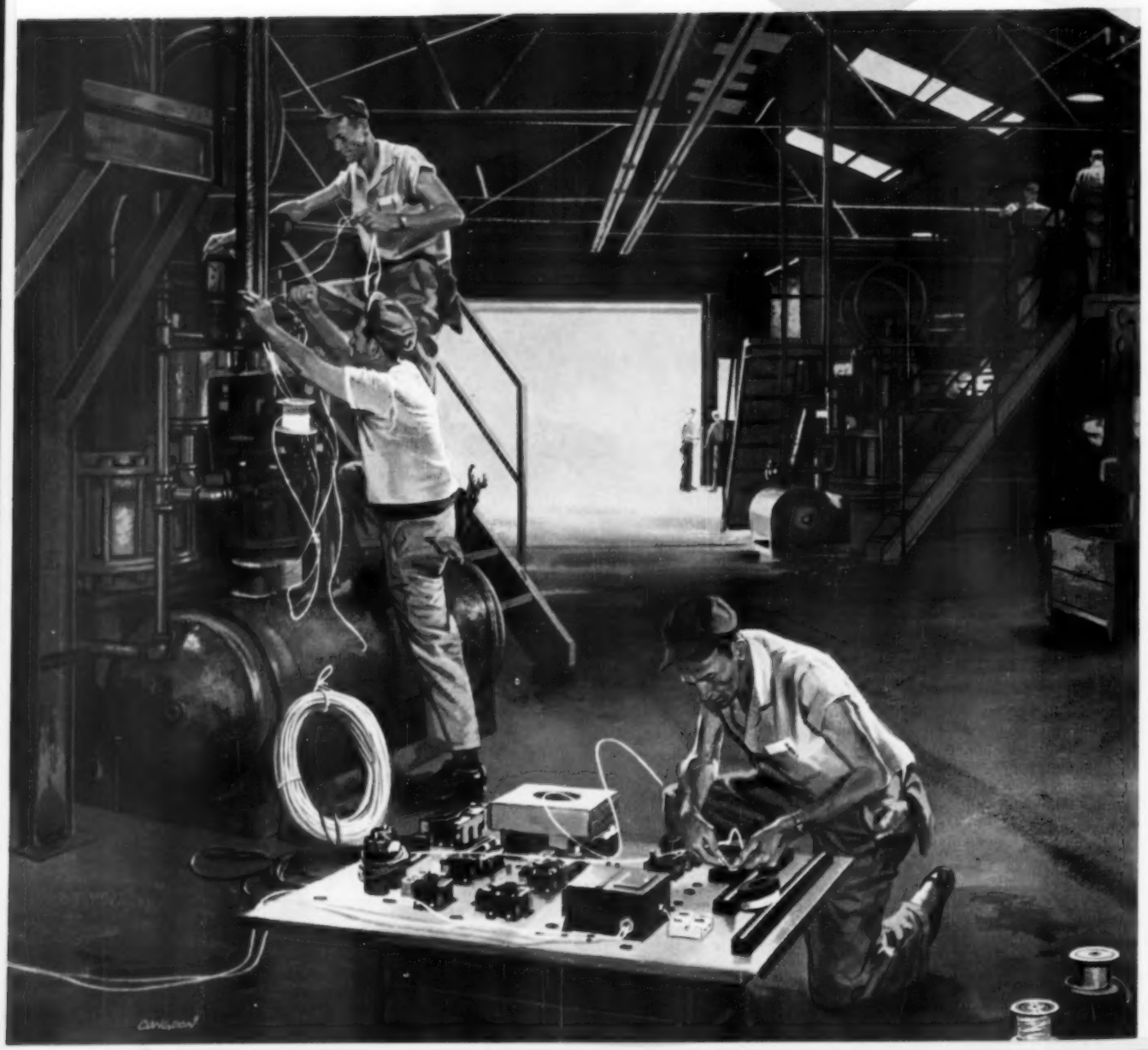

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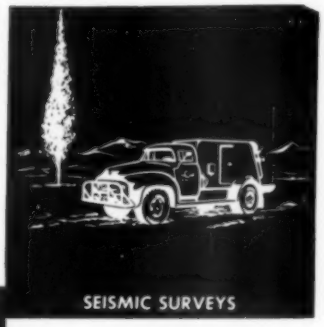
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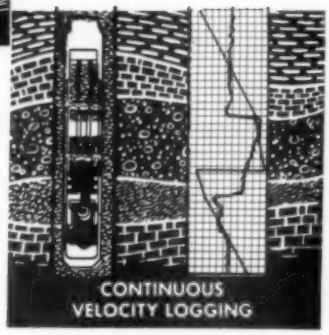
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A JOURNAL TECH-REPORT

FIELD AND RESERVOIR DATA

Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Area (acres)	Thickness	Reservoir Drive *	Wells Capable 1-1-57	Ultimate Recovery MM Bbl.	Cum. Prod. M. Bbl. 1-1-57	Gravity A.P.I.
Manitoba Oil Fields												
Daly	1951	10-27w1	Miss.	2,550	Comb.	8,400	47.0	Water	213	15.36	4,641.22	32.4
Ebor	1954	9-29w1	Miss.	2,610	Struc.	440	43.0		11	0.64	84.57	34.0
Lulu Lake	1952	1-21w1	Miss.	3,295	Struc.	120	16.3		3	0.09	39.61	35.1
Maples	1955	10-26w1	Miss.	2,103	Struc.	520	35.0		12	0.65	155.73	32.8
N. Virden	1953	11-26w1	Miss.	2,010	Struc.	7,024	40.0	Water	175	27.06	3,412.68	34.9
Pierson	1954	3-29w1	Miss.	3,270	Struc.	360	15.0	Solution gas	7	0.14	113.90	37.0
Routledge	1955	9-25w1	Miss.	2,100	Strat.	880	29.0		15	2.37	118.56	35.0
Tilston	1952	5-29w1	Miss.	3,095	Struc.	280	20.0		8	0.29	79.11	32.6
Virden-Roselea	1953	10-26w1	Miss.	2,030	Struc.	8,000	20.5	Solution gas	254	12.69	4,004.35	34.9
W. Butler	1955	9-29w1	Miss.	2,670	Struc.		47.0		6		36.07	33.0
Whitewater	1953	3-21w1	Miss.	2,550	Struc.	240	40.0	Solution gas	6	0.43	85.05	32.5
Woodnorth	1954	8-27w1	Miss.	2,470	Struc.	720	30.0	Water	16	1.18	448.35	33.6

LEGEND

*Solution gas. P—Partial water drive. W—Water. G—Gravity segreg. O—Oil expansion. C—Gas cap.: (1) very large, (2) large, (3) small. M(N)—Natural press. maint., M(G)—gas inj. press. maint., M(W)—water inj. press. maint.: (1) excellent, (2) very good, (3) good, (4) fair, (5) poor. S-G—Inefficient gas sweep. S-W—Inefficient water sweep.

CANADIAN GAS-FIELD DATA

Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Wells Capable 1-1-57	Disposable P.L. Gas (MMM c.f.) 1-1-57 *
Alberta Gas Fields							
Acheson	1950	52-25w4	Viking	3,390	Struc.		10.0
	1950	53-26w4	Blair.	4,100	Comb.		49.0
	1952	52-26w4	Leduc D-3 Sol.	5,250	Reef		33.6
Alexander		56-27w4	Bsl. Blair.		Comb.		30.0
Alhambra	1954	42-6w4	Card. Sol.	6,350	Strat.		10.0
Ashmont	1949	60-11w4	L. Cret.	1,650			10.0
Athabasca	1943	66-24w4	L. Cret.	1,650	(?)		3.6
Athabasca, East	1951	66-23w4	Wab. (D-1)	2,150	(?)		1.2
Atlee-Buffalo	1951	21-6w4	Viking	2,525	Comb.		70.0
	1952	21-6w4	Bsl. Blair.	3,195	Struc.		70.0
Beaver Creek			Wab. (D-1)		Strat. (?)		20.0
Beaverhill Lake	1946	52-19w4	Viking	2,650	Strat.		48.0
		52-19w4	Blair.		(?)		2.0
Belloy		78-1w6	Cadotte		Struc.		3.0
		78-1w6	Notikewin		Struc.		7.0
	1951	78-1w6	Gething	3,080	Comb.		50.0
	1951	78-1w6	Miss.	4,500	Comb.		15.0
Bellshill Lake		41-12w4	Viking		Comb.		2.0
	1955	41-12w4	Bsl. Blair.	2,974	Comb.		40.0
Bindloss	1952	22-4w4	Viking	2,190	Comb.		180.0
		22-4w4	Bsl. Blair.		Comb.		20.0
Bittern Lake		47-22w4	Viking		(?)		1.0
		47-22w4	Blair.		(?)		25.0
Black Butte	1944	1-8w4	Bow Is.	2,150	Comb.		12.0
	1944	1-8w4	Ellis (Ribbon)	2,950	Comb.		2.0
		1-8w4	Ellis (Sawtooth)		Comb.		8.2
	1944	1-8w4	Rundle	3,250	Comb.		10.0
Boiloque Lake	1951	64-26w4	Viking	2,150	Comb. (?)		3.0
	1949	64-26w4	Blair.	2,900	Comb.		9.0
Bonnie Glen	1951	47-27w4	Leduc gas cap	6,800	Reef		369.0
	1952	47-27w4	Leduc Sol.	6,900	Reef		283.0
Bonnyville	1951	60-5w4	Colony		Comb.		3.4
Bow Island	1909	11-12w4	Bow Is.	2,005	Strat.		16.0
Boyle-Muntangamisk Lake	1949-51	65-18w4	L. Cret.	1,900	Comb.		5.0
	1949	64-18w4	Nisku	2,040	Comb.		15.0

*As of January 1, 1957.

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FIELD AND RESERVOIR DATA

Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Disposable P.L. Gas (MMM c.f.) 1-1-57 *	Wells Capable 1-1-57
Braeburn	1954	77-10w6	Cadomin	5,100	(?)	....	6.0
	1954	77-10w6	Triassic	5,560	(?)	....	6.0
	1954	77-10w6	Perm.-Penn.	7,250	(?)	....	40.0
Braeburn, West	....	.....	Paddy	....	Struc.	....	5.0
	....	.....	Cadotte	....	Struc.	....	3.0
	....	.....	Cadomin	....	(?)	....	4.0
	....	.....	Triassic	....	(?)	....	10.0
	....	.....	Jurassic	....	(?)	....	3.0
Brooks, Northeast	....	19-14w4	Bow Is.	....	.....	....	5.0
	1946	19-14w4	Sunburst	3,280	.....	....	4.8
Brooks-Tilley	....	17-12w4	Milk River	....	Strat.	....	19.0
	....	17-12w4	Sunburst	....	.....	....	10.0
Burnt River	....	76-10w6	Paddy	....	Struc.	....	2.0
	....	76-10w6	Bluesky	....	Struc.	....	8.0
Calgary	....	24-1w5	Wab. (Cross.)	....	Strat.	....	45.0
Campbell-Namac	1949	54-25w4	Bsl. Blair.	3,640	Comb.	....	40.0
Carbon	....	29-23w4	Glauc. sd.	....	Strat.	....	30.0
Castor	1949	38-14w4	Viking	3,140	.....	....	18.0
	1942	38-14w4	U. Blair.	3,470	.....	....	2.0
Cessford	1953	22 to 28w4 11 to 15w4	Viking	2,760	Struc.	....	75.0
	1950	23-11w4	Bsl. Colo.	2,920	Comb.	....	775.0
	1950	26-14w4	Bsl. Blair.	3,310	Comb.	....	220.0
Chancellor	....	25-21w4	Viking	....	Strat.	....	4.0
	....	25-21w4	Bsl. Colo.	....	.....	....	12.0
	....	25-21w4	L. Cret.	....	.....	....	13.0
Chigwell	1952	41-24w4	L. Cret.	5,160	Comb. (?)	....	15.0
Chinook Ridge	....	65-12w6	Paddy	....	.....	....	5.0
	....	65-12w6	Cadotte	....	.....	....	20.0
	....	65-12w6	Notikewin	....	.....	....	20.0
Clive	....	40-24w4	Viking	....	.....	....	3.0
	....	40-24w4	Blair.	....	Comb.	....	3.0
	1951	40-24w4	Nisku gas cap	6,350	Comb.	....	7.0
	1952	40-24w4	Leduc gas cap	6,350	Reef	....	3.0
Cold Lake	....	63-3w4	Blair.	....	Comb.	....	1.0
Comrey	....	1-6w4	Bow Is.	....	Strat.	....	45.0
Connorsville	....	.....	Viking	....	.....	....	7.0
	....	.....	Bsl. Blair.	....	.....	....	11.0
Control	....	24-16w4	Viking	....	.....	....	10.0
	....	24-16w4	Bsl. Blair.	....	.....	....	10.0
Countess	1950	20-16w4	Bow Is.	3,000	Strat.	....	50.0
	1951	20-15w4	Bsl. Blair.	3,132	.....	....	4.0
Crossfield	....	28-2w5	Miss. (Elkton)	....	Strat.	....	85.0
Dixonville	1952	86-1w6 87-27w5	Gething	2,450	Struc.	....	27.0
Donalda	1951	42-19w4	Viking	3,350	Struc.	....	8.0
	1951	42-19w4	Detrital	3,770	.....	....	2.0
Duchess	....	20-15w4	Bow Is.	....	.....	....	10.0
	....	20-15w4	Bsl. Colo.	....	Strat.	....	9.0
Duhamel	....	45-21w4	Viking	....	Struc.	....	5.0
	....	45-21w4	Blair.	....	Comb.	....	2.0
	....	45-21w4	Dev. Sol.	....	Reef	....	4.0
Duvernay	....	56-14w4	Viking	....	Strat.	....	1.0
Dyberg	....	44-23w4	Belly R.	....	.....	....	3.0
	....	44-23w4	Viking	....	.....	....	8.0
	....	44-23w4	Bsl. Blair.	....	.....	....	3.0
Eagle Hill	....	33-4w5	Miss. (Elkton)	....	.....	....	30.0
Eaglesham	1952	77-25w5	Peace R.	1,750	.....	....	1.0
	....	77-25w5	Gething	....	(?)	....	4.0
	....	77-25w5	Cadomin	....	(?)	....	4.0
	1952	77-26w5	Miss.	4,700	(?)	....	7.0
Elk Point	....	56-6w4	Blair.	....	.....	....	0.6
Erskine	1950	39-21w4	Viking	3,850	Comb.	....	2.0
	1952	39-21w4	Blair.	4,440	Comb.	....	15.0
		39-21w4	Leduc gas cap	....	Reef	....	22.0
	1953	39-21w4	Leduc Sol.	5,250	Reef	....	8.0
Etzikom	1951	6-8w4	Bow Is.	2,225	Strat.	....	125.0
	....	6-8w4	Bsl. Blair.	....	.....	....	1.0
Excelsior	1949	56-24w4	Viking	2,750	Struc.	....	7.0
	1950	56-24w4	Bsl. Blair.	3,500	Struc.	....	27.0
Eyremore	....	18-18w4	Bow Is.	....	Strat.	....	15.0

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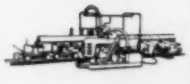
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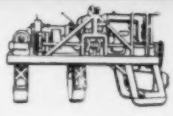
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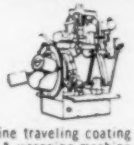
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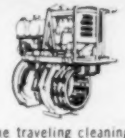
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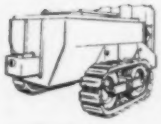
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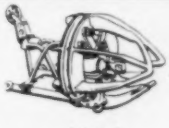
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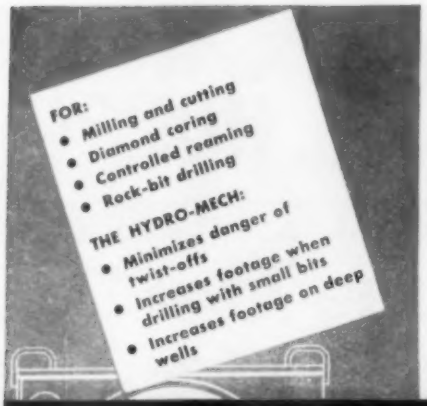

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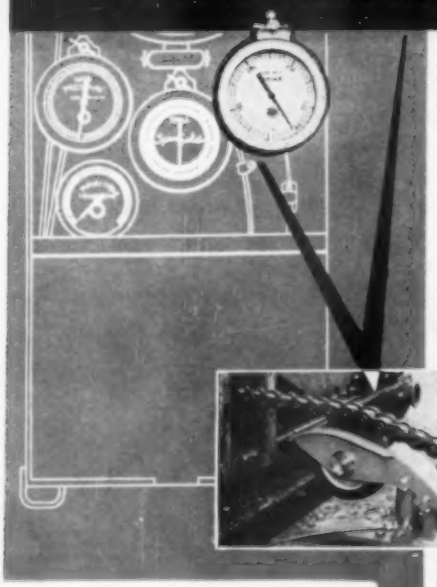

Easy to move from well to well.

Stabilizes chain and gives it longer life.

Models for single or double-link chains.

The Hydro-Mech idler assembly rides under the rotary chain and transmits hydraulic impulses to a gauge in the drilling-control panel or in any other convenient spot.

Torque is one of the most important variables in any drilling operation — with too little, you're wasting men and equipment; with too much, you're courting an expensive twist-off. Recognizing these pitfalls, more and more contractors and operators are demanding that their rigs be equipped with Hydro-Mech torque gauges. Compared to a $10,000 fishing job, the cost of a Hydro-Mech is certainly negligible.

MARTIN-DECKER CORP.

HOME OF THE WEIGHT INDICATOR — LONG BEACH, CALIFORNIA

THOMPSON

HEAVY DUTY Self-Aligning SAND SEALED-OFF PUMPS

Lower your lifting cost by using Thompson Sand Seal Self-Aligning Metal-to-Metal Pumps, or with our Combination Plunger and Cup Pumps. Equipped with Regular or Extra Long Alloy Plungers, ground individually to fit the barrels, assuring longer life on both pump and surface equipment.

SELF-ALIGNING SAND SEALED-OFF PUMPS Fig. 600-800

Inverted Combination Single or Double Plunger Self-Aligning Pumps can be equipped with a Sand Flush Valve which seals the Plunger off on top and cleans the barrel every pump stroke.

Sand is deposited into blind cage above the plunger and is discharged every stroke of the pump. The bottom of plunger is sealed to eliminate slippage. Easy on surface equipment. Lower lifting cost with Sealed-Off Pumps.

COMBINATION ROD GUIDE AND PARAFFINE SCRAPER

This exclusive Thompson device eliminates wear on rods and pump. Insures proper alignment and removal of paraffine ahead of pump. Allows pump to pull freely. Standard equipment with many operators.

SPECIAL HEAVY DUTY SEATING DEVICE

This special Combination Sand Housing and Seating Device is invaluable in bad sand conditions, especially where pump is sanding into the tubing. In extremely sandy wells the pump may be unseated occasionally to allow a small portion of tubing fluid to flush through the sand housing and return the accumulated sand to the well.

Fig. 700A Heavy Duty Seating Device

Pumps for all fields, depths and conditions. For further information write for complete catalog.

Fig. 600-800-900

THOMPSON PUMP CO.

OKMULGEE, OKLAHOMA

SUPPLY STORE STOCKS

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Happy Co., Salem, Illinois
Mid Way Pipe & Supply Co. Greggton, Texas
Rodman Supply Co., Pampa, Texas
V. A. Sauls, Heidelberg, Miss.
Jack Yates Pipe & Supply Co., Gladewater, Texas

SALES & SERVICE STORES

Drumright, Okla.
Edmond, Okla.
Eureka, Kansas
Healdton, Okla.
Heidelberg, Miss.
Kilgore, Texas
Natchez, Miss.
Oil City, Miss.
Reed City, Mich.
Seminole, Okla.
Shidler, Okla.
Stephens, Ark.
Vivian, La.

A JOURNAL TECH-REPORT

FIELD AND RESERVOIR DATA

Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Wells Capable 1-1-57	Disposable P.L. Gas (MMM c.f.) 1-1-57 *
Fairydell-Bon Accord	....	57-23w4	Viking	....	Strat.	....	90.0
		57-23w4	Bsl. Blair.	....	Struc.	....	8.0
Fenn-Big Valley	1950	35-20w4	Viking	3,900		....	15.0
	1952	36-20w4	Nisku Sol.	5,200	Struc.	....	70.0
	1952	36-20w4	Leduc	3,550	Reef	....	5.0
Foremost	1916	6-11w4	Bow Is.	2,150	Strat.	....	21.0
Fort Saskatchewan	1951	54-22w4	Viking	2,490	Comb.	....	120.0
Garrington	....	34-4w5	Leduc	....	Reef	....	25.0
Gem	....	23-17w4	Viking	....	....	....	8.0
	....	23-17w4	Bsl. Colo.	....	....	....	1.0
	....	23-17w4	Bsl. Blair.	....	....	....	2.0
Ghost Pine	....	31-22w4	Blair.	....	....	....	13.0
	....	31-22w4	Miss.	....	....	....	2.0
Gilby	1955	41-2w5	Viking	6,000	Strat.	....	3.0
		41-2w5	Bsl. Blair.	....	....	....	8.0
	1954	41-2w5	Miss. (Pekisko)	6,875	Strat.	....	180.0
	....	41-2w5	Wab.	....	Comb. (?)	....	5.0
Golden Spike	1949	51-27w4	Viking	3,570	Struc.	....	2.0
	1949	51-27w4	Blair.	4,320	Struc.	....	9.0
	1949	51-27w4	Wab.	4,570	Struc.	....	12.0
	1950	51-27w4	Nisku gas cap	4,990	Struc.	....	3.0
	1951	51-27w4	Nisku Sol.	4,900	Struc.	....	9.0
	1949	51-27w4	Leduc Sol.	5,700	Reef	....	75.0
Goodwin Lake	....	.....	Viking	....	.....	....	4.0
	....	.....	Jurassic-Nordegg	....	.....	....	25.0
Gordondale	1952	79-10w6	Cadotte	2,800	Struc.	....	55.0
	....	79-10w6	Gething	4,100	Comb.	....	10.0
	....	79-10w6	Cadomin	4,550	Struc.	....	60.0
Grassy Island Lake	....	11-13w4	Viking	....	Strat.	....	20.0
Hackett	....	.....	Bsl. Blair.	....	Strat.	....	45.0
Hairy Hill	....	55-14w4	Viking	....	....	....	2.0
	....	55-14w4	Blair.	....	....	....	11.0
Hamelin Creek	1951	80-6w6	Cadotte	1,780	Struc.	....	5.0
	1951	80-6w6	Gething	3,285	Comb.	....	40.0
Hamilton Lake	1952	35-9w4	Viking	2,975	Strat.	....	40.0
Hanna-Watts	....	31-14w4	Viking	....	.....	....	3.6
	....	31-14w4	Blair.	....	.....	....	4.2
	....	31-14w4	Miss.	....	.....	....	2.5
Harmattan-Elkton	....	32-4w5	Miss. (Elkton) nonassoc.	....	Strat.	....	20.0
		32-4w5	Miss. gas cap	....	Strat.	....	950.0
	1955	32-4w5	Miss. Sol.	9,180	Strat.	....	90.0
Hercules	....	52-23w4	Viking	....	(?)	....	9.0
	....	52-23w4	Bsl. Blair.	....	(?)	....	10.0
Homeglen-Rimbey	1953	42-1w5	Leduc gas cap	7,890	Reef	....	800.0
	1953	43-1w5	Leduc. Sol.	9,180	Reef	....	50.0
Hussar	....	23-20w4	Bsl. Colo.	....	Strat.	....	15.0
	....	23-20w4	Glauc. sd.	....	Strat.	....	90.0
Jourcam	1949	49-21w4	Viking gas cap	3,220	Strat.	....	50.0
Jumping Pound	1944	24-4w5	Rundle	9,700	Struc.	....	538.0
Kathryn	....	26-28w4	Wab. (Cross.)	....	Strat.	....	30.0
Kessler	1953	39-9w4	Viking	2,540	Strat.	....	50.0
Kevisville	....	.....	Leduc.	....	Strat.	....	10.0
Lac La Biche	1949	68-13w4	Viking	800	Strat.	....	30.0
	1949	68-13w4	McMurray	1,440	Strat.	....	10.0
Leahurst	....	39-18w4	Blair.	....	....	....	7.7
Leduc-Woodbend	1947	50-26w4	Viking	3,450	Strat.	....	12.0
	1947	49-26w4	Blair.	4,310	Comb.	....	151.0
	1947	49-26w4	Nisku gas cap	5,200	Struc.	....	32.5
	1947	50-26w4	Nisku Sol.	4,900	Struc.	....	58.0
	1947	50-26w4	Leduc gas cap	5,250	Reef	....	348.0
	1947	50-26w4	Leduc Sol.	5,250	Reef	....	56.8
Lindbergh	1946	25-56w5	Viking	1,000	Struc.	....	2.0
	1946	25-56w5	Colony	1,280	Struc.	....	1.5
Little Smoky River	1954	67-22w5	Perm.-Penn.	5,700	Struc.	....	2.0
	1954	67-22w5	Miss.	6,500	Struc. (?)	....	2.0
	1954	67-22w5	Leduc gas cap and Sol.	8,675	Reef	....	10.0
Lloydminster	1935	.....	Colony	1,680	Comb.	....	4.0
	1939	49-1w4	Sparky	1,918	Comb.	....	2.1

*As of January 1, 1957.

CANADA—Oil and Gas Unlimited!

A JOURNAL TECH-REPORT

FIELD AND RESERVOIR DATA

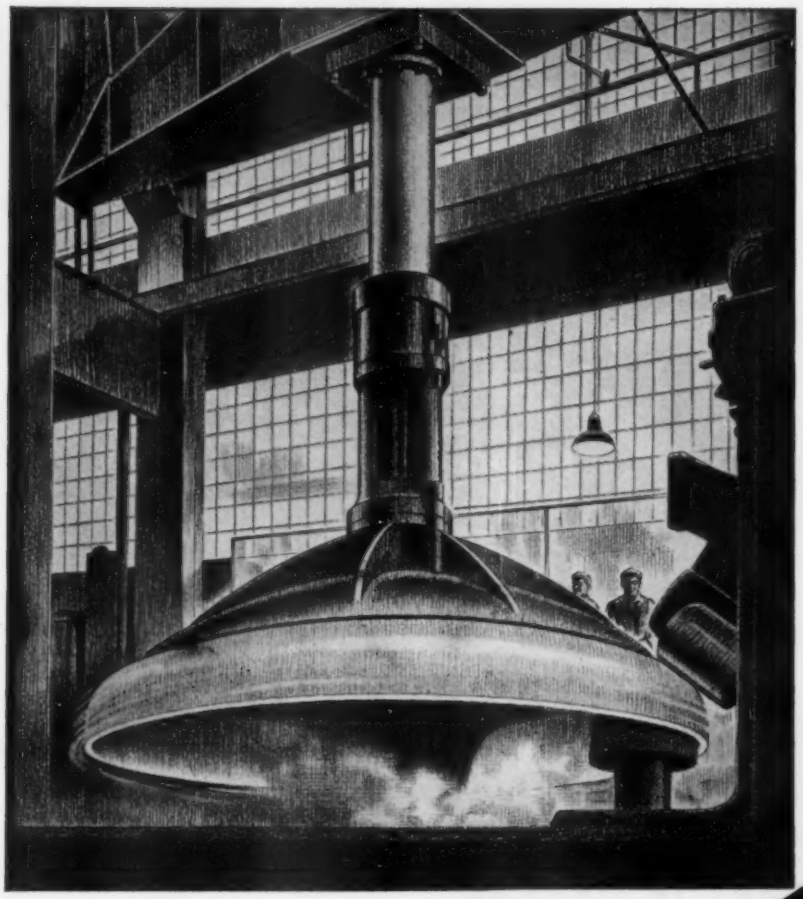
Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Wells Capable 1-1-57	Disposable P.L. Gas (MMM c.f.) 1-1-57 *
Majeau Lake	1951	56-4w5	Glauc. sd.	4,010	Struc.	....	2.0
	1951	56-4w5	Rundle	4,210	Struc. (?)	....	10.0
Malmo	....	....	Viking	....	Strat.	....	3.0
	1952	44-22w4	Bsl. Blair. gas cap	4,700	Comb.	....	3.0
	....	44-22w4	Bsl. Blair. Sol.	....	Comb.	....	2.0
	....	44-22w4	Nisku gas cap	....	Struc.	....	3.0
	1952	44-22w4	Nisku Sol.	4,900	Struc.	....	3.0
	....	44-22w4	Leduc gas cap	....	Reef	....	1.0
	1952	44-22w4	Leduc Sol.	5,250	Reef	....	2.0
Manyberries	1947	4-6w4	U. Bow Is.	2,600	Strat.	....	6.0
	1947	4-6w4	L. Bow Is.	2,600	Strat.	....	59.0
Medicine Hat	1904	11-4w4	Med. Hat	1,500	Strat.	....	1,000.0
	1926	11-4w4	Bow Is.	2,500	Strat.	....	15.0
	1947	11-4w4	Ellis	3,300	Strat.	....	15.0
Minnehik-Buck Lake	1952	46-6w5	Miss.	6,800	Comb.	....	50.0
Morinville	....	55-25w4	Viking	....	Struc.	....	2.0
	1948	55-25w4	Bsl. Blair	3,580	Struc.	....	100.0
Mountain Park	....	....	Tri. (Spray R.)	....	....	....	25.0
Nevis	1952	39-22w4	L. Cret.	4,575	Comb.	....	30.0
	1952	39-22w4	Dev.	2,920	Comb.	....	480.0
New Norway	....	44-22w4	Viking	....	Struc.	....	2.0
	....	44-22w4	Blair.	....	Struc.	....	5.0
	1951	44-22w4	Nisku	4,500	Struc.	....	3.0
Normandville	1949	79-22w5	Gething	2,450	Struc.	....	12.0
	....	79-22w5	Triassic	....	(?)	....	5.0
	....	79-22w5	Perm.-Penn.	....	(?)	....	3.0
	....	79-22w5	Rundle	....	(?)	....	5.0
	....	....	Rundle	....	....	....	10.0
Obed	....	38-21w4	Viking	....	Struc.	....	0.4
Oberlin	....	38-21w4	Bsl. Blair.	....	Struc.	....	0.7
	1951	21-28w4	Wab. (Cross.)	8,500	Strat.	....	135.0
Okotoks	1952	32-1w5	Wab. (Cross.)	8,400	....	....	70.0
Olds	1950	28-4w4	Viking	2,585	Struc.	....	8.0
Oyen	....	15-26w4	Rundle	....	....	....	15.0
Parkland	1954	47-7w5, 47-9w5, 48-6w5	Belly R.	....	Strat.	....	1.0
Pembina	1953	48-8w5	Card. Sol.	5,120	Strat.	....	700.0
	....	....	Bsl. Blair.	....	Strat.	....	1.0
	....	....	Rundle	....	Struc.	....	3.0
	1946	3-9w4	Bow Is.	2,100	Strat.	....	145.0
Pendant D'Oreille	....	89-4w6	Gething	....	(?)	....	9.0
Phil Can	....	89-4w6	Miss.	3,680	(?)	....	4.0
	....	46-27w4	Leduc	....	Reef	....	10.0
Pigeon Lake	1948	3-29w4	Rundle	11,700	Struc.	....	1,800.0
Pincher Creek	1923	80-13w6	Cadotte	2,200	Comb.	....	200.0
Pouce Coupe	1952	80-12w6	Cadomin	4,210	Comb.	....	10.0
	....	78-12w6	Doe Creek	1,370	Comb.	....	8.0
Pouce Coupe, South	....	77-12w6	Cadotte	3,350	Struc.	....	87.0
	....	78-12w6	Cadomin	5,250	Comb.	....	10.0
	....	78-12w6	Tri. (Schooler Cr.)	5,850	Comb.	....	10.0
	....	18-12w6	Bow Is.	....	Strat.	....	5.0
Princess	1945	18-12w4	Bsl. Colo.	2,905	Strat.	....	30.0
	....	18-12w4	Sunburst	....	Strat.	....	100.0
	1947	19-12w4	Rundle gas cap	3,270	Strat.	....	5.0
	1948	20-12w4	Jefferson gas cap	3,955	Comb.	....	28.0
Provost	1946	35-5w4	Viking	2,690	Strat.	....	500.0
	1946	35-5w4	L. Cret.	2,500	....	....	10.0
Redwater	1949	57-21w4	Viking	1,950	....	....	10.0
	1948	57-21w4	Leduc Sol.	3,300	Reef	....	62.5
Rochester	1951	62-24w4	Viking	2,050	Strat.	....	4.0
	1952	62-24w4	U. Blair.	2,510	(?)	....	3.0
	....	62-24w4	Clearwater	....	....	....	9.0
	1949	62-24w4	Glauc.	2,650	....	....	3.0
	1951	62-24w4	Bsl. Blair.	2,740	....	....	4.0
	1952	62-24w4	Wab.	2,730	Comb.	....	5.0
Rolling Hills	1950	15-13w4	Bow Is.	2,310	....	....	21.0
	....	15-13w4	Bsl. Colo.	....	....	....	6.0
Rosebud	....	27-21w4	Viking	....	Strat.	....	5.0
	....	27-21w4	Glauc. sd.	....	....	....	10.0
	....	27-21w4	Bsl. Blair.	....	Strat.	....	10.0

*As of January 1, 1957.

Spinning

SAVES METAL

—CUTS TOOL COSTS



The design and production of Pressure Vessels may be greatly facilitated by using dished and flanged ends spun by Harveys on the Rotarpress. They combine semi-ellipsoidal form with large knuckle radius. A substantial reduction in plate thickness can be effected, and in most cases tool costs are eliminated.

'Rotarprest' Ends for Pressure Vessels

can be supplied in Mild, Alloy and Clad Steels and Non-Ferrous Metals. The capacity of the Rotarpress ranges from 5 to 15 feet diameter, and $\frac{3}{8}$" to 4" thickness. Knuckle radii and depth may be varied to meet individual requirements.

Please ask for List No. OG-965 giving full range of sizes.

Harvey

G. A. HARVEY & CO. (LONDON) LTD.
WOOLWICH ROAD, LONDON, S.E.7.,
ENGLAND. *Cables:* "Cheaper, London"

CATS MULTIPLY FAST IN CANADA

Nowhere is Canada's swift industrial progress more striking than in the recent development of its oil refining and petrochemical facilities. Canada's daily refining capacity already approaches 700,000 barrels. New petrochemical plants are rising from coast to coast, to meet the demand for paints, alcohol, ammonia, plastics, detergents, synthetic rubber and other products of petroleum or natural gas.

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(*We regret that we cannot advise on the merits of oil or mining securities*)

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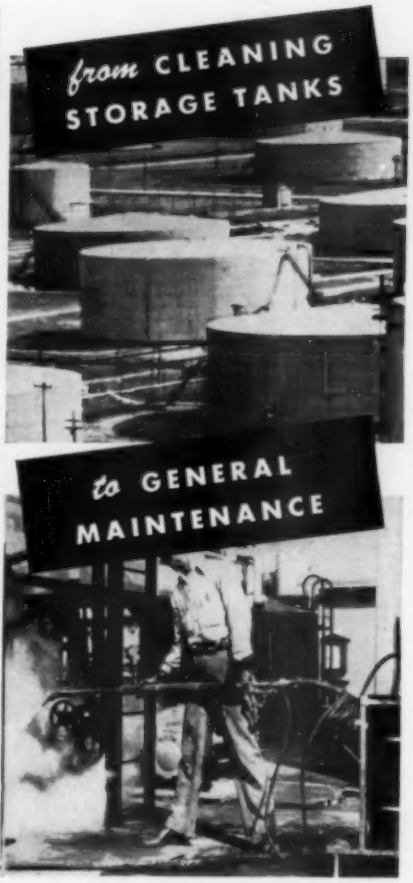


Oakite cleaning does it better, reduces costs

Going inside an 80,000 gallon storage tank to clean manually was slow, wasteful; but with Oakite detergents and spray method, the entire inside was bared clean in only 12 hours, costs cut over 75%.

How to get at hard-to-reach surfaces and remove grease and muck without scraping or wire brushing? With an Oakite Steam-Detergent Gun. At one refinery, it helped a man do two weeks work in a day.

Just two more of the many ways the Oakite man and the materials, methods and equipment behind him can *simplify* and *save* on your cleaning operations. Send for Bulletin F-7629. Oakite Products, Inc., 39 Rector Street, New York 6, N. Y.

OAKITE

Export Division Cable Address: Oakite

Technical Service Representatives in Principal Cities of U. S. and Canada

FIELD AND RESERVOIR DATA

Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Wells Capable 1-1-57	Disposable P.I. Gas (MMM c.f.) 1-1-57*
Rosedale	....	28-20w4	Viking	....	....	....	7.0
Rycroft	1952	28-20w4	Bsl. Blair.	....	....	....	12.0
		77-4w6	Gething (assoc. and nonassoc.)	3,800	Strat.	....	12.4
St. Albert	1952	53-26w4	Viking	3,010	Comb.	....	2.0
St. Paul	1951	53-26w4	L. Cret.	3,750	Comb.	....	40.0
Saddle Hills	....	58-9w4	Blair.	....	Struc.	....	0.8
	....	76-8w6	Peace R.	....	Struc.	....	23.0
Samson	....	76-8w6	L. Cret.	....	Comb.	....	2.0
	1953	44-24w4	Bsl. Blair. (assoc. and nonassoc.)	4,780	Comb.	....	12.0
Sarcee	1954	23-3w5	Rundle	10,000	....	....	150.0
Savanna Creek	1954	14-4w5	Rundle	....	Struc.	....	670.0
Sibbald	1950	27-2w4	Viking	2,530	Strat.	....	30.0
	1952	27-2w4	Blair.	2,735	....	....	3.0
Smith Coulee	1947	3-10w4	Bow Is.	1,920	Strat.	....	7.0
Stettler	1949	38-20w4	Nisku Sol.	4,900	Struc.	....	11.0
	1949	38-20w4	Leduc Sol.	5,250	Reef	....	4.0
Sturgeon Lake	1952	71-23w5	Leduc Sol.	8,650	Reef	....	18.0
Sturgeon Lake, South	....	69-22w5	Gething	4,500	Comb.	....	13.0
	....	69-22w5	Tri. nonassoc.	....	Comb.	....	3.0
	1955	69-22w5	Tri. Sol.	4,970	Comb.	....	8.0
	....	69-22w5	Leduc Sol.	....	Reef	....	105.0
Sturgeon Lake, South—general area	....	68-25w5	Gething	5,000	(?)	....	42.0
	....	68-25w5	Triassic	....	(?)	....	18.0
	....	68-25w5	Perm.-Penn.	6,375	(?)	....	2.0
Suffield	1911	15-9w4	Milk River	1,000	Strat.	....	19.0
Sundre	1955	34-5w5	Miss. (Elkton) gas cap	9,200	Strat. (?)	....	15.0
	....	34-5w5	Miss. Sol.	....	Strat. (?)	....	30.0
Sylvan Lake	1953	38-2w5	Bsl. Blair.	6,770	....	....	34.0
	1953	38-2w5	Miss. (Pekisko)	7,025	....	....	6.0
	....	38-2w5	Dev.	....	....	....	4.0
Tangent	1951	80-24w5	Cadotte	1,147	Struc.	....	10.0
	1951	80-24w5	Gething	2,500	Comb.	....	90.0
	1951	80-24w5	Triassic	2,825	Comb.	....	70.0
Three Hills Creek	....	35-25w4	Belly R.	....	....	....	5.0
	....	35-25w4	Viking	....	....	....	5.0
	....	35-25w4	Miss.	....	....	....	25.0
Turin	....	11-19w4	Bow Is.	....	....	....	4.0
	....	11-19w4	Bsl. Blair.	....	....	....	18.0
	1951	11-19w4	Ellis	3,575	....	....	4.0
	1950	11-19w4	Rundle	3,675	....	....	2.0
Turner Valley	1924	19-2w5	Rundle gas cap	3,800	Strat.	....	205.0
	1924	19-2w5	Rundle Sol.	3,800	Strat.	....	150.0
Viking-Kinsella	1914	48-10w4	Viking	2,100	Strat.	....	559.0
	....	48-10w4	Blair.	....	Strat.	....	16.0
	....	48-10w4	Dev.	....	Struc.	....	4.0
Warburg	....	48-2w5	Belly R.	....	....	....	3.0
Wayne	....	48-2w5	Viking	....	....	....	9.0
	1954	27-20w4	Viking	....	Strat.	....	10.0
West Drumheller	....	27-20w4	Bsl. Blair. assoc.	....	Strat.	....	11.0
	....	29-21w4	Bsl. Blair.	....	....	....	3.0
	....	29-21w4	Nisku gas cap	....	Struc.	....	7.0
	1952	29-21w4	Nisku Sol.	5,250	Struc.	....	11.0
Westerose	1953	29-21w4	Leduc Sol.	5,700	Reef	....	1.0
	1952	46-28w4	Leduc gas cap	6,850	Reef	....	90.0
Westerose, South	1952	46-28w4	Leduc Sol	7,050	Reef	....	60.0
Westlock	1953	44-1w5	Leduc nonassoc.	7,650	Reef	....	450.0
	....	60-26w4	Viking	....	Comb.	....	200.0
West Prairie	....	60-26w4	Blair.	....	....	....	2.0
	....	.....	Cadotte	....	....	....	15.0
Westward Ho	....	33-5w5	Gething	....	....	....	5.0
	1955	33-5w5	Miss. (Elkton) nonassoc.	....	Strat.	....	30.0
	....	....	Miss. (Elkton) Sol.	8,650	....	....	13.0
Whitelaw	1950	81-1w6	Gething	2,850	Struc.	....	60.0
	1950	81-1w6	Tri. (Spray R.)	3,500	Struc.	....	50.0
Wildmere	....	.....	L. Cret.	....	Strat.	....	4.5
Wildunn Creek	1952	29-14w4	Viking	3,080	Strat.	....	15.0

*As of January 1, 1957.

Wall thickness: .207″
Depth of hardness: .020″-.030″
Material: nickel molybdenum steel

Nickel Molybdenum Steel Barrels

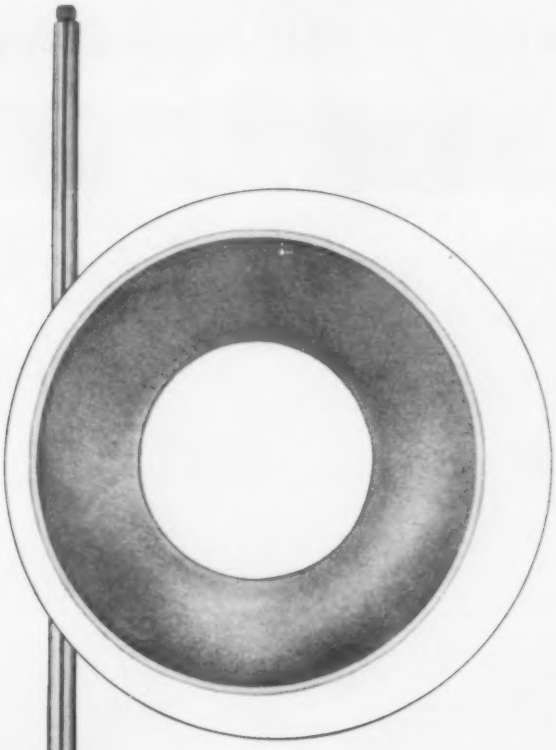
FLAME-HARDENED DEEP

for Axelson Heavy-Wall Pumps

AXELSON HEAVY-WALL PUMP BARRELS are made from special nickel molybdenum steel that resists corrosion—particularly hydrogen sulfide. The tubing is flame-hardened to a depth of .020″-.030″. Subsequent low-temperature tempering relieves quenching strains, eliminates possibility of distortion. The result: The ideal unit for deep-well pumping. Strong, rigid and extremely resistant to corrosion and abrasion. One-piece tube won't flex or bind.

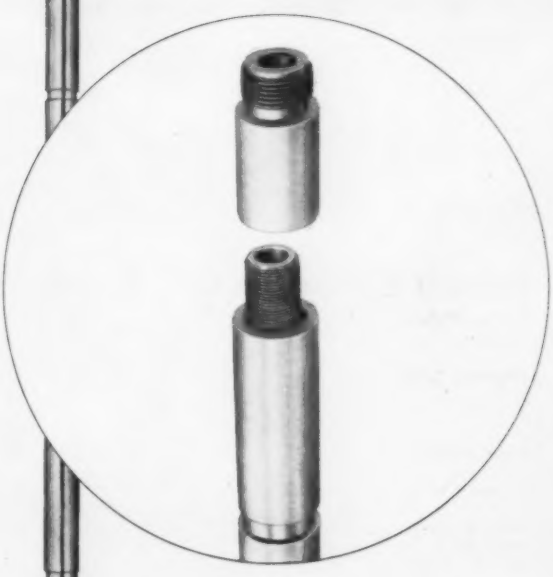
AXELSON PICTORIAL

AXELSON PLUNGERS RECOMMENDED FOR HEAVY-WALL PUMPS



AXITE PLUNGER

New Axite one-piece plunger is a low-carbon steel tube sprayed with high-nickel-content hard-facing material to make it highly resistant to wear and particularly resistant to corrosion in hydrogen sulfide conditions. Surface hardness is Rockwell "C" 62.



COMPOSITE PLUNGER

Composite plunger is made of special-analysis iron, cast in precision sections, and assembled on a tube. Thus the plunger assembly is both corrosion and abrasion resistant. Surface hardness is equivalent to Rockwell "C" 55-60.

For complete information on Axelson Heavy-Wall Pumps, write to Department PO-8.

AXELSON PUMPS AND RODS

Axelson Manufacturing Company
Division of U.S. Industries, Inc.
6160 South Boyle Avenue
Los Angeles 58, California

For quality production equipment and service:
Axelson stores throughout California.
Jones and Laughlin Supply stores in Mid-Continent, Rocky Mountains, and Canada.
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CANADA—Oil and Gas Unlimited!

A JOURNAL TECH-REPORT

FIELD AND RESERVOIR DATA

Field	Disc. Date	Location (Twp. & Rge.)	Formation	Average Depth	Structure	Wells Capable 1-1-57	Disposable P.L. Gas (MMM c.f.) 1-1-57 *
Wimborne	....	34-26w4	Viking	....	.....	....	1.0
	1951	34-26w4	Nisku gas cap	7,310	.....	....	2.0
	....	34-26w4	Leduc gas cap	.....	Reef	.....	65.0
Windfall	....	59-15w5	Viking	....	.....	.....	5.0
	....	59-15w5	Rundle	....	.....	.....	1.0
	....	59-15w5	Leduc nonassoc.	.....	Reef	.....	600.0
Wizard Lake	1951	48-27w4	Viking	4,060	Struc.	.....	2.0
	1951	48-27w4	L. Cret.	4,800	Struc.	.....	8.0
	1951	48-27w4	Leduc Sol.	6,350	Reef	.....	98.5
Wood River	1953	43-23w4	Bsl. Blair.	4,950	.....	....	15.0

British Columbia Gas Fields

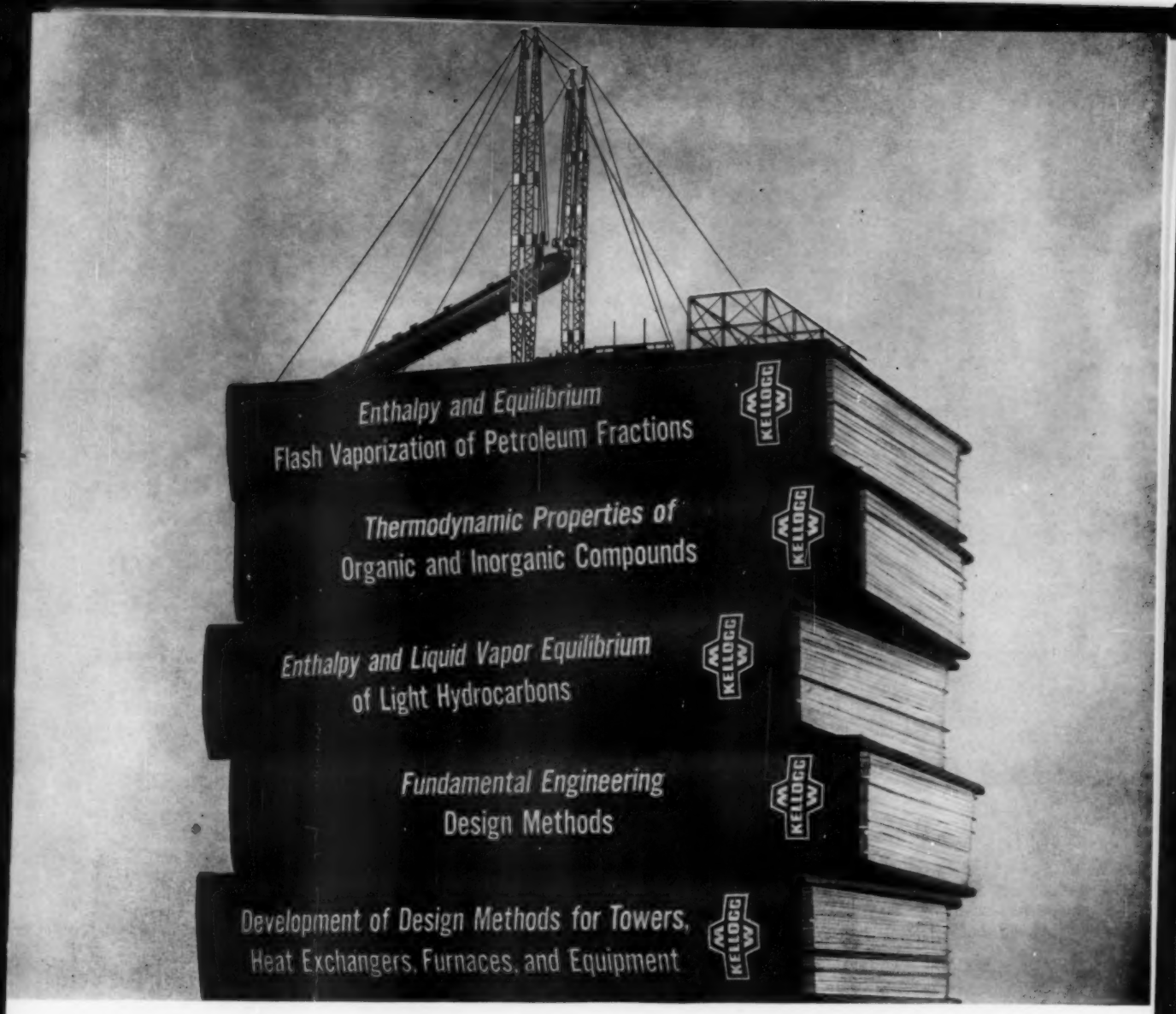
Alaska Highway	....	92-26w6	Tri. and Miss.	....	.....	5	200
Blueberry	1955	56° 56′ N 122° 3′ W	Tri. and Miss.	4,850	Struc.	8	290
Boundary Lake	1955	85-14w6 86-13w6	Gething, Triassic (assoc.) and gas cap	.....	Struc.	4	120
Buick Creek	1953	89-20w6	Gething, Nikanassin, and Triassic	.....	Struc.	16	250
Cameron River	1955	56° 25′ N 122° 29′ W	Triassic	....	Struc.	1	40
Dawson Creek	1956	78-14w6	Perm.-Penn.	7,950	Struc.	1	28
Doig River	1955	88-17w6	Jurassic	3,774	Struc.	1	13
Fort St. John	1951	83-19w6	L. Cret., Triassic, and Perm.-Penn.	....	Struc.	53	1,050
Gundy Creek	....	91-36w6	Triassic	4,830	.....	1	8
Halfway Lake	1954	87-25w6	L. Cret., Triassic, Perm.-Penn. and Miss.	.....	Struc.	3	60
Klua Creek	1956	58° 32′ N 122° 22′ W	Devon.	6,850	Struc.	1	23
Milligan	1955	57° 4′ N 120° 22′ W	Jur., Cret., Tri.	3,424	Struc.	2	30
Montney	1954	86-19w6	Triassic	3,600	Struc.	3	16
Nig Creek	1954	57° 3′ N 121° 44′ W	Triassic	4,200	Struc.	3	220
Paddy	1955	57° 47′ N 121° 14′ W	Devon., Triassic	7,934	Strat.	1	15
Parkland	....	81-15w6	Devon. and Miss.	.....	.....	1	140
Pingel Creek (Kiskatinaw)	1953	81-18w6	Triassic	3,955	Struc.	3	25
Red Creek	....	85-20w6 85-21w6	Triassic	5,000	.....	5	35
Sunrise	1951	79-16w6	L. Cret.	3,200	Struc.	4	30
Stoddart	....	86-20w6	Perm.-Penn. and Miss. (?)	....	.....	1	15

*As of March 1, 1957.

Saskatchewan Gas Fields

Brock	1951	28-20w3	Viking	2,375	Comb.	13	20.920
Cantuar	1952	16-17w3	Cantuar	3,150	Strat.	1	16.740
Coleville-Smiley	1951	31-23w3	Viking	2,300	Comb.	43	168.000
Dodslend-Cook Lake	1951	32-20w3	Viking	2,200	.....	1	3.556
Eureka	1954	31-23w3	Viking	2,375	Comb.	....	9.262
Glidden	1953	27-24w3	Viking	2,300	Comb.	3	2.216
Gull Lake	1952	13-19w3	Bsl. Cantuar	3,600	Comb.	7	9.130
Hatton	1953	14-30w3	Medicine Hat	....	.....	6	133.000
Hoosier	1954	31-27w3	Viking	2,400	Comb.	....	114.250
Lloydminster	1935	48-28w3	Colony	....	.....	26	9.767
Lone Rock	1944	47-27w3	Colony	1,670	.....	5	0.770
Marengo	1954	28-27w3	Viking	2,360	Comb.	1	1.539
Milton	1954	30-27w3	Viking	2,400	Comb.	3	6.143
Success	1953	17-16w3	N. Success, Cantuar	3,050	Comb.	5	10.140
Unity	1944	39-23w3	Viking	1,880	Comb.	9	2.600
	1944	39-23w3	Unity	....	.....	....	10.325

*As of January 1, 1957.



Soundest Foundation for a Chemical Plant

The soundest capital investment in a chemical plant is an investment founded on sound engineering.

Few engineering and construction firms in the chemical field have attained such high levels of technical competence as The M. W. Kellogg Company. None has spent so much time and effort in analyzing, correlating, and recording the scientific data accumulated from its pilot plants, the commercial plants it has built, and scientific literature.

One result of this continuing task, which benefits all Kellogg engineers as well as the industry in general, is Kellogg's Technical Data Book—a major responsibility of the company's Design Data Section. A single volume of 437 pages in 1938, it comprises several volumes at present, with a total of more than 2,500 pages.

Some parts of the Data Book have been published and are used throughout the world as standard engineering references. However, the full economic benefits of the total work are realized only in Kellogg-engineered processes and plants.

Chemical companies are invited to review with Kellogg engineers the various aspects of the Technical Data Book as these are related to new processing facilities.

M KELLOGG W

CHEMICAL PROCESS DIVISION

THE M. W. KELLOGG COMPANY

711 THIRD AVENUE, NEW YORK 17, N. Y.

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At the installation site (above) Polk used their new B-70 tractor for this tough hauling job. *(right)* This rigger's truck (a Mack B-80) was used for loading and unloading the 215,000-lb. compressor.

How to handle a 107½-ton Compressor!

"Get yourself a couple of Macks—a tractor for pulling the low-boy and a rigger's truck for the bull work." That's the way the H. C. Polk Trucking Company of Prentiss, Mississippi, handled the moving and placement of this 215,000-lb. compressor recently installed in Greenville.

"We have been hauling in the oil fields for many years . . . long enough to know that the trucks we can really depend upon are Macks. They've got what it takes for heavy hauling over the rough terrain and through the gumbo mud we usually encounter. Their engines withstand sustained low-gear pulling and long periods of heavy winching. Mack transmissions, rear ends, and Balanced Bogies are second to none for low maintenance and long service."

This is what Mr. H. C. Polk, president of Polk Trucking, says about Macks. A Mack user for over 10 years, he's typical of the heavy oil field haulers who have found that for cost-saving, dependable operation nothing beats Mack heavy-duty trucks and tractors. They're real profit-makers! Why not let your Mack representative give you full details and specifications. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK
first name for
TRUCKS

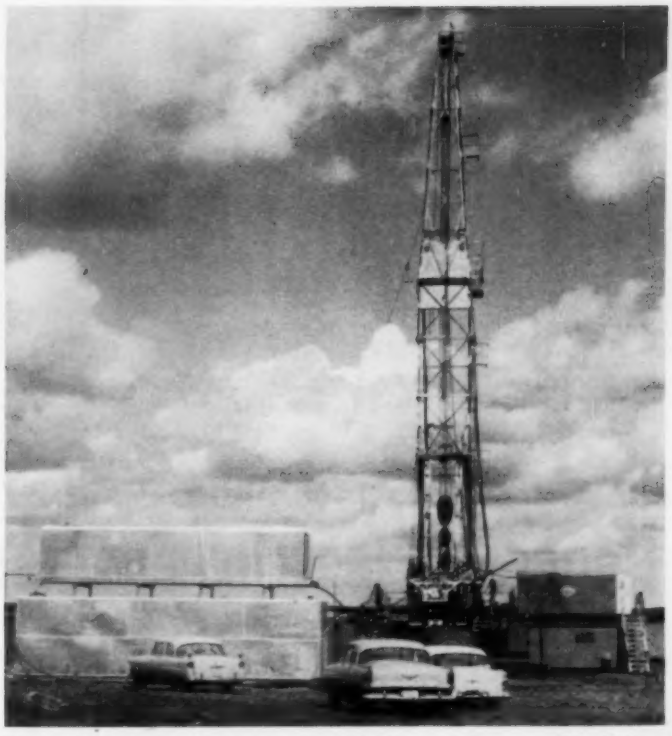
5172

Inaccessible locations force operators to

More Slant Holes in Canada

Revised daily drilling report is designed to provide more information —faster

By A. G. G. de Chastelain



DRILLING under Joseph Lake, barely visible in background. This is Peter Bawden Drilling, Ltd.'s, Rig No. 5.

THE 2-year period from June 1, 1955, to June 1, 1957, has seen an appreciable increase in the volume of directional-drilling work performed in western Canada. The technique has been used in practically all its fields of application on inland locations. Hole-straightening, side-tracking, milling through casing, relief wells, and kick-back jobs (directing a hole back into its permitted target area) all have been done successfully with the help of the whipstock. And this continues to be the most popular deflecting tool in Canada. These jobs, however, although significant in number, lend themselves less well to comparative analysis than controlled-directional-drilling jobs in oil fields containing surface hazards which render numerous locations inaccessible.

The January 7, 1957, edition of The Oil and Gas Journal carried a summary of a comparison between eight wells directionally drilled in Pembina and an equal number drilled in a similar manner in Joffre-Burbank field. Since those wells were drilled, the form of daily drilling report has been revised with a view to obtaining more information more readily and so facilitating job analysis and comparisons. This report is shown in Fig. 1. To have a quick comparison between proposed or estimated performance and actual performance on every job done, the form shown in Fig. 2 was devised. This article is based upon information contained only in these two forms.

In order that any improvement in performance may become evident and to establish more accurate average performance figures, the data published January 7 have been included in the statistical and cost tables contained in this article. The previous article dealt with only 16 wells, we are now concerned with 39 wells.

The jobs are numbered in the order

TABLE 1—CONTROLLED FOOTAGE

Job No.	Pembina	Joffre-Burbank	Joseph Lake	Breton
1	4,137	1,760	860	980
2	3,975	3,352	3,168	1,848
3	1,010	1,934	2,492	.....
4	985	3,852	.....	.....
5	5,155	2,864	.....	.....
6	1,250	1,164	.....	.....
7	1,197	3,891	.....	.....
8	1,490	2,970	.....	.....
9	1,208	3,191	.....	.....
10	3,834	1,345	.....	.....
11	3,777	1,718	.....	.....
12	1,870	907	.....	.....
13	1,850	2,612	.....	.....
14	1,872	1,493	.....	.....
15	4,041	1,267	.....	.....
16	3,549	.....	.....	.....
17	2,664	.....	.....	.....
18	1,814	.....	.....	.....
19	1,331	.....	.....	.....

Summary

Field—	No. of wells	Total controlled footage	Avg. ft. per well
Pembina	19	47,009	2,470
Joffre-Burbank	15	34,320	2,285
Joseph Lake	3	6,520	2,173
Breton	2	2,828	1,414
	39	90,677	2,320

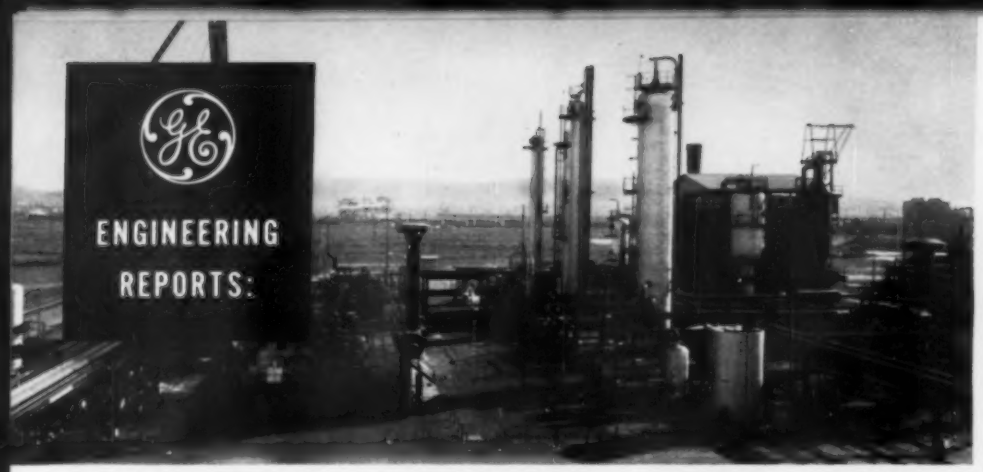
TABLE 2—DEVIATION IN FEET

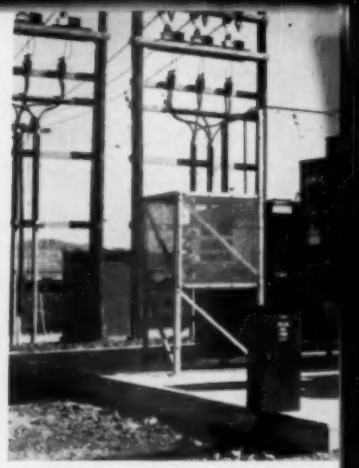
Job No.	Pembina	Joffre-Burbank	Joseph Lake	Breton
1	1,559.6	527.02	215.22	236.12
2	1,604.37	1,294.38	1,475.54	568.64
3	205.02	592.84	1,027.93	.....
4	172.17	1,220.40	.....	.....
5	1,905.50	1,019.79	.....	.....
6	162.57	177.17	.....	.....
7	267.70	1,417.88	.....	.....
8	279.91	1,287.45	.....	.....
9	278.01	1,318.47	.....	.....
10	1,592.10	334.50	.....	.....
11	1,748.86	539.15	.....	.....
12	590.01	158.14	.....	.....
13	621.88	925.99	.....	.....
14	536.06	357.41	.....	.....
15	1,879.18	304.9	.....	.....
16	1,432.75	.....	.....	.....
17	467.22	.....	.....	.....
18	448.56	.....	.....	.....
19	296.90	.....	.....	.....

Summary

Field—	No. of wells	Total deviation	Avg. ft. per well
Pembina	19	16,048.37	844.65
Joffre-Burbank	15	13,348.02	889.86
Joseph Lake	3	2,718.69	906.23
Breton	2	804.76	402.38
	39	32,919.84	844.1

CANADA—Oil and Gas Unlimited!





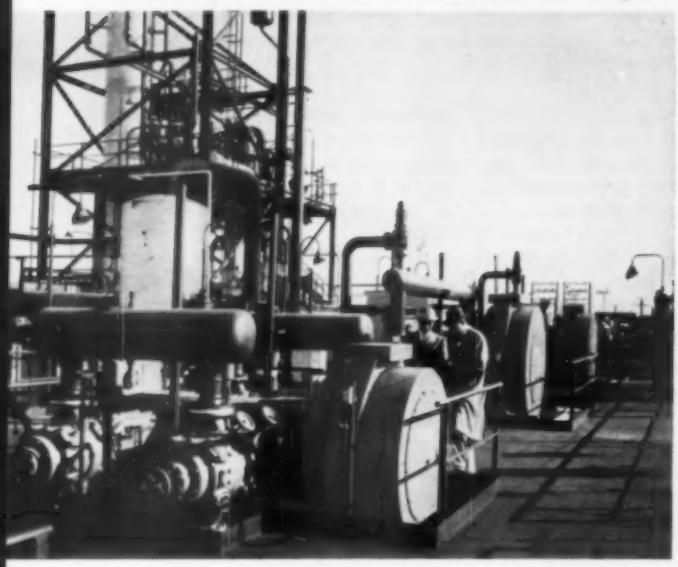
BUILT IN 14 MONTHS by The M. W. Kellogg Co., new ammonia plant is a unit of Standard's Richmond refinery, one of West's largest. All electric equipment is by General Electric, which also provided engineering service to help achieve fast start-up.

CO-ORDINATED for top reliability, G-E equipment in master substation for ammonia

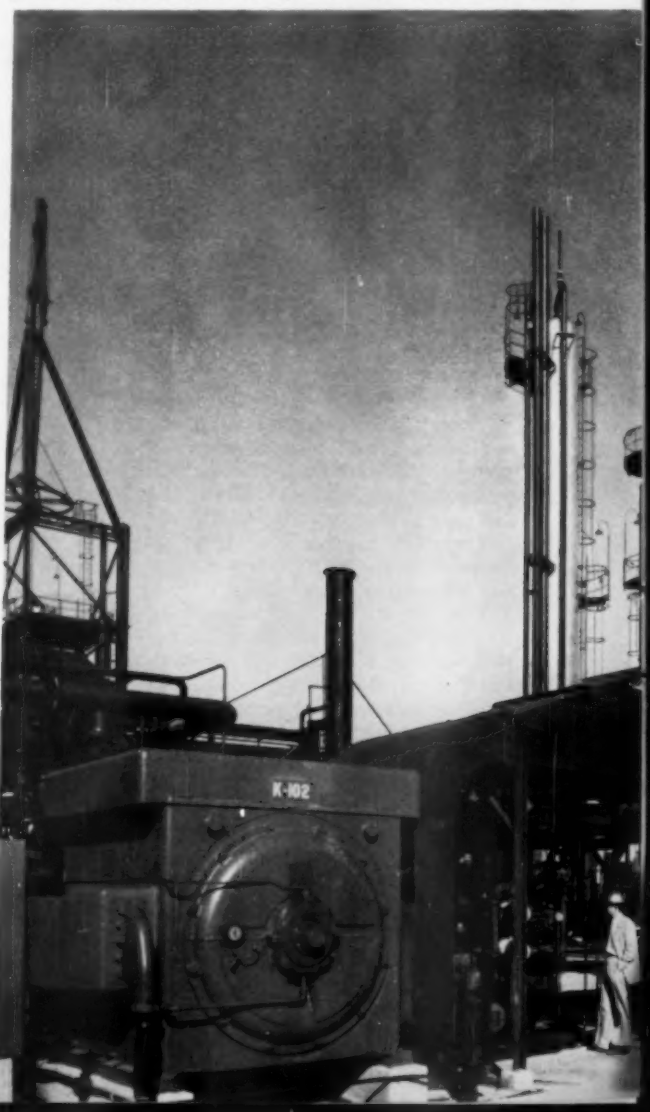
At Standard's Richmond, Calif., refinery . . .

General Electric engineering services help

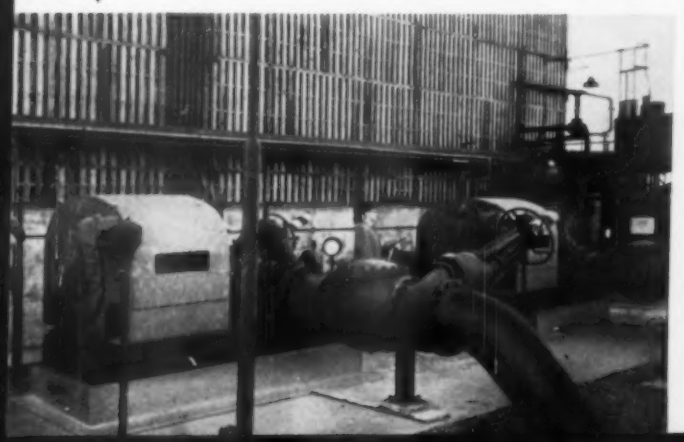
OUTDOOR-LOCATED on platform to drive compressors are 8 high-efficiency, enclosed, force-ventilated G-E synchronous motors (3 shown) with excitation obtained from substation's d-c m-g sets.



PLANT'S BIGGEST, a 4000-hp 12,000-v totally enclosed force-ventilated G-E induction motor drives synthesis gas compressor. Explosion-proof 60-hp G-E motor (r.) drives blower



WEATHER-PROTECTED, 2 rugged 350-hp G-E induction motors drive cooling-water pumps. Other plant induction motors are either enclosed force-ventilated or explosion-proof, fan-cooled. ▼



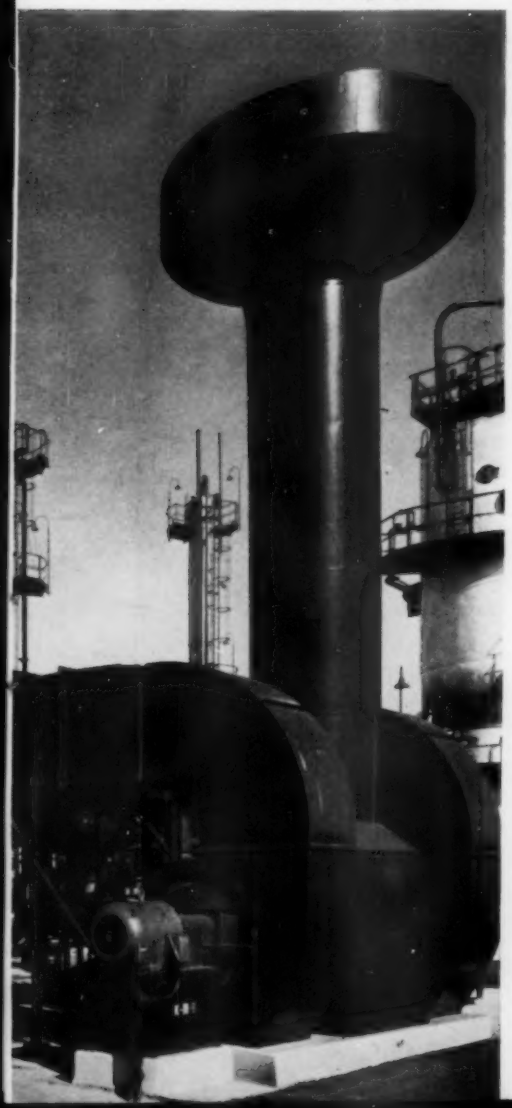
plant includes 5000-kva transformer, 17 units of 12-kv metal-clad switchgear, 2300-v Limitamp* motor starters, 480-v outdoor motor control centers, 2 outdoor motor-generator sets, and two 480-v transformers.

*Registered trade-mark of General Electric Co.

EASY MAINTENANCE of plant's G-E metal-clad switchgear is shown by workman removing vertical-lift, magne-blast circuit breaker for inspection.

speed opening of 300-ton/day ammonia plant

drawing clean air—via black ductwork and mushroom tower—from upper level of uncontaminated atmosphere.



General Electric power system, installed to meet rigid construction schedule, helps plant get fast start on profitable production

Standard Oil Company of California, Western Operations, Inc., recently added to its Richmond, California refinery—the largest west of the Rockies—a new $11 million ammonia plant designed, engineered and built by The M. W. Kellogg Co. The plant's capacity of approximately 300 tons per day of anhydrous and aqueous ammonia is shipped to nearby California Spray Chemical Corp., a subsidiary, for conversion into fertilizer.

GENERAL ELECTRIC supplied the new plant's electric equipment—compressor drives, auxiliary motors, and complete outdoor substation with co-ordinated components. In addition, General Electric engineering services helped both customer and designer get the new plant from the discussion stage to on-stream in only 14 months.

An example was the contribution of General Electric installation and field service engineers. By supervising the installation of the electric equipment as scheduled deliveries arrived, they helped reduce field installation costs, speed completion of construction schedules, and hasten start-up time. To Standard, this meant getting into production faster, and thereby, showing a return sooner on the large capital investment tied up in the plant.

IN ADDITION, the 17,000-kva block of power will be integrated into the existing plant system. General Electric application engineering services, working closely with Standard and Kellogg representatives, helped provide the electrical equipment co-ordination and integration necessary to meet the plant's process power requirements.

For *your* new chemical plant, too, General Electric offers a one-manufacturer source of quality electric equipment and valuable engineering services to help provide you and your process contractor with an efficient, co-ordinated electrical system. Early in your planning, contact your nearest General Electric Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y. 662-49

Engineered Electrical Systems for the Process Industries

GENERAL ELECTRIC

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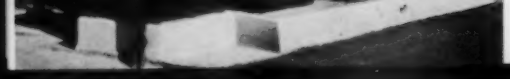


DAILY DIRECTIONAL DRILLING REPORT — **EASTMAN OIL WELL SURVEY COMPANY LIMITED** — DEPTH FROM ____ TO ____

COMPANY | WELL NAME | LSD | SEC | TWP | RGE | CONTRACTOR | DATE | JOB No.

SUPT. | RATE OF BUILD UP ° PER 100' | No. DEFLECTION TOOLS SET | TOTAL DAYS

Set up No.	Depth From	Depth To	Formation	WT	R.P.M.	P. Pr.
1						
2						
3						
4						
5						

Visc. | Objective at | T.V.D.
Mud Wt. | Deflection at | Feet
W.L. | Direction | CSG Size

SINGLE SHOT RECORD

Depth	Drift	Dir.	Lat. N-S	Dep. E-W

Feet Per Hook up

#1	
#2	
#3	
#4	

Angle Unit

12°	Days
20°	Days
90°	Days

DEFLECTION TOOLS RUN

Type	Size	Depth	Feet Made	EXPECTED Direction	EXPECTED Drift	Setting	RESULT Drift	RESULT Direction	Orientation Method

No.	Bit Size and Type	Stabilizers and Make	D*
1			
2			
3			
4			

DRILLING SET UPS

RENTALS	Total Days
Single Shot Inst.	
Monel Drill Collar	
Monel Drill Collar	
Stabilizer Body	
Stabilizer Body	
String Reamer Body	
H/O Body	
Subs	X
	X
	X
	X
	X
	X
Bit Hole Finder — No. Runs	
Pup Joint — No. Runs	
W/s Single — No. Runs	

SUPPLIES Size	DESCRIPTION	SERIAL NO	Total
	RMR Cutters		
	H-O Cutters		
	Easten Stab.		
	Easten String RMP		
	W/S Bit		
	Rock Bits		

REMARKS D* = Distance from bottom of Bit to center of Stab. Blades

TIME BREAK DOWN	HOURS
Rig Serv.	
Rig Rep.	
Trip Time	
Drlg. Time	
Reaming	
Mud Cond. & Circ.	
Surveying	
Orienting	
Coring	
Logging	
Fishing	
Misc.	
Total Hours	

TIME RECORD

M-S

S-A

A-M

DAY | FIRST ☐ | ADDITIONAL ☐ | SURVEY ☐ | STAND BY ☐

ENG. | ASST.

MILEAGE TODAY | TOTAL MILES

REMARKS

Company Engineer

REVISED form above provides for more information on directionally drilled holes. With this new form it is easier to compare and analyze jobs. The form at right gives a quick check between the estimated performance and the actual performance on directionally drilled holes. Figs. 1 and 2.

in which they were carried out in each field. Total depths are not shown in order to prevent well identification.

While Pembina and Joffre-Burbank fields represent by far the greater part of the drilling under review, two other fields have been added as they may

TABLE 3—MAXIMUM ANGLE

Job No.	Pembina	Joffre-Burbank	Joseph Lake	Breton
1	31°	29°30′	24°15′	18°45′
2	32°30′	31°	42°	25°30′
3	15°	28	36°30′	.....
4	20°15′	27°	.....	.....
5	34°	32°	.....	.....
6	14°30′	12°30′	.....	.....
7	20°15′	27°	.....	.....
8	14°30′	33°20′	.....	.....
9	23°	57°	.....	.....
10	37°	21°30′	.....	.....
11	36°45′	26°	.....	.....
12	29°	30°	.....	.....
13	25°	32°45′	.....	.....
14	23°30′	28°30′	.....	.....
15	43°	21°	.....	.....
16	30°	.....	.....	.....
17	14°30′	.....	.....	.....
18	18°	.....	.....	.....
19	18°	.....	.....	.....

Summary

Field—	No. of wells	Avg. max. angle
Pembina	19	25°15′
Joffre-Burbank	15	27°45′
Joseph Lake	3	34°15′
Breton	2	22°7½′

EASTMAN OIL WELL SURVEY CO. LTD., CALGARY

DIRECTIONAL DRILLING DIVISION

JOB #

Starting Date ____ Customer ____ Field ____

Legal Description ____ Contractor ____ Rig # ____

Direction and angle of dip ____ Size hole ____ Surface Pipe ____

Drift and Direction at Start ____

Required change of direction ____

RECORD OF JOB	
Depth of 1st W.S.	
Depth of 2nd W.S.	
Depth of 3rd W.S.	
Depth of 4th W.S.	
Depth of 5th W.S.	
Depth of 6th W.S.	
Depth of 7th W.S.	
Depth of 8th W.S.	
No. of deflecting tools	
No. of changes of hook-up	
Feet per change of hook-up	
Average feet per day	
Feet per hour on bottom	
Number of surveys	

BREAK-DOWN OF TIME	HOURS	%
Drilling		
Surveying		
Tripping		
Reaming		
Orienting		
Coring		
Logging		
Fishing		
Circulating or Conditioning Mud		
Rig Repairs		
Rig Service		
Waiting		
Miscellaneous		
TOTAL		

BITS USED Type	Size	Number	Feet Drilled
Total			

PERFORMANCE	Proposed	Actual
Measured Depth		
True Vertical Depth		
Controlled Footage		
Deviation		
Direction		
Maximum Angle		
Number of days		
Cost $		

EASTMAN OPERATORS

be the scene of further directional-drilling activity and the small volume of work done there already, provides an interesting comparison with that of Pembina and Joffre-Burbank.

Controlled footage, deviation and maximum angle . . . These are shown in Tables 1, 2, and 3. Controlled footage varied from 860 to 5,155 ft., deviation from a low of 172 ft. to a high of 1,905 ft. and maximum angle from 14° 30′ to a high of 57°. These features of a job are, of course, dictated by circumstances and cannot be changed to any great extent by the operator.

Single-shot surveys . . . The fewer surveys taken on a directional job, the quicker the job will be completed.

TABLE 4—SINGLE SHOT SURVEYS

	Pembina		Joffre-Burbank	
Job No.	No. of surveys	Ft. per survey	No. of surveys	Ft. per survey
1	71	58.2	45	39.1
2	56	71.0	56	60.0
3	19	53.2	28	69.0
4	60	16.4	53	72.6
5	114	45.2	42	68.4
6	32	39.1	17	68.5
7	32	37.4	42	92.5
8	18	82.8	35	85.0
9	20	60.4	75	42.6
10	39	98.3	24	56.0
11	78	48.3	17	100.5
12	25	75.0	20	45.4
13	21	88.2	30	87.1
14	25	75.0	29	51.6
15	56	72.0	26	48.7
16	29	122.0		
17	29	92.0		
18	24	75.6		
19	17	78.4		
Average	40.3	61.4	35.9	63.7
	Joseph Lake		Breton	
1	15	57.4	15	65.3
2	39	81.3	32	57.8
3	22	113.5		
Average	25.3	85.8	23.5	60.2

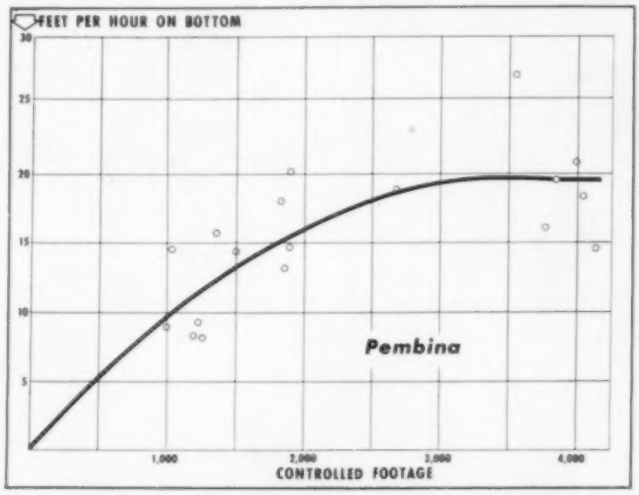
TABLE 5—NUMBER OF DEFLECTING TOOLS EMPLOYED

Field—	No. of wells	Total No. of deflecting tools	Average D.T. per well
Pembina	19	46	2.4
Joffre-Burbank	15	41	2.7
Joseph Lake	3	8	2.67
Breton	2	3	1.5
	39	98	2.5

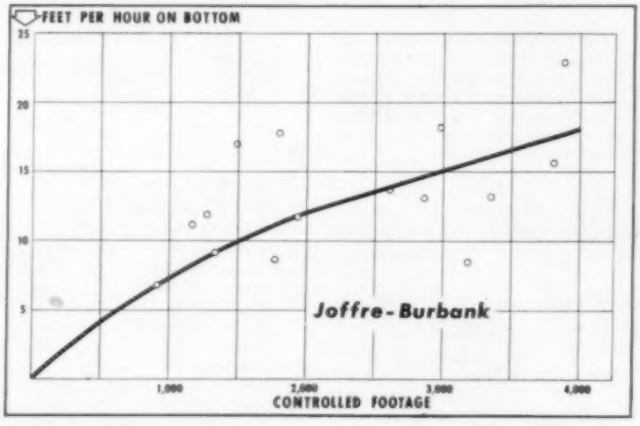
Summary

No. of whipstocks used	No. of jobs	Total whipstocks
1	13	13
2	13	26
3	5	15
4	3	12
5	2	10
6	1	6
7	0	0
8	2	16
	39	98

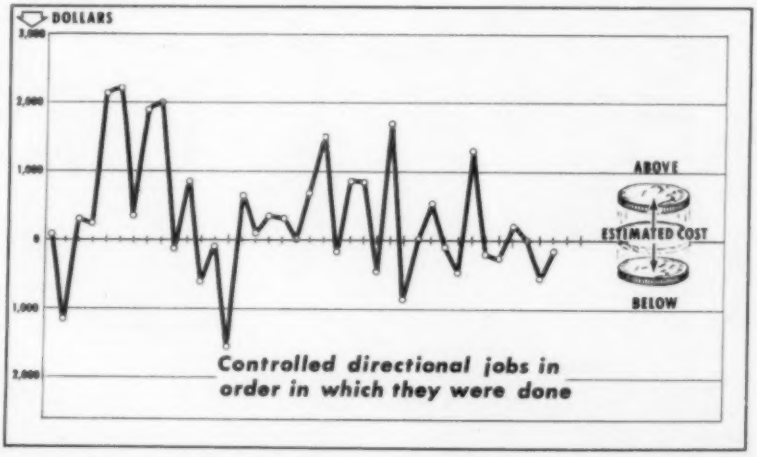
*Average number of whipstocks jer job —2.5.



PENETRATION RATES are an excellent measure of the relative efficiency of a directionally drilled hole. Data shown are for wells in Pembina field. Fig. 3.



HERE AGAIN penetration rate increases with the amount of controlled footage. Fig. 4.



ONCE EXPERIENCE IS GAINED you can accurately estimate the cost of a directional hole. Fig. 5.

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TABLE 6—COMPARISON BETWEEN BREAKDOWN OF TIME

(a) Hours—	Pembina	Joffre-Burbank	Joseph Lake	Breton
Drilling	3,079.25	2,578.0	203.5	53.5
Surveying	422.75	387.5	55.75	7.5
Tripping	1,471.75	1,274.25	99.50	19.5
Reaming	189.00	195.50	7.00	2.5
Orienting	54.00	65.25	16.00	3.0
Fishing	151.0	76.25		
Circ. and cond. mud	307.0	268.75	27.5	1.0
Rig repairs	136.5	288.75	7.0	3.25
Rig service	127.5	89.5	14.0	2.25
Miscellaneous	50.5	6.5	8.75	3.50
Total	5,989.75	5,230.25	439.00	96.00

(b) Per cent—	Pembina	Joffre-Burbank	Joseph Lake	Breton
Drilling	51.40	49.20	46.30	55.82
Surveying	7.05	7.39	12.70	7.85
Tripping	24.60	24.40	22.70	20.40
Reaming	3.16	3.72	1.60	2.62
Orienting	.91	1.24	3.65	3.14
Fishing	2.52	1.45		
Circ. and cond. mud	5.12	5.13	6.26	1.04
Rig repairs	2.27	5.51	1.60	3.40
Rig service	2.13	1.70	3.19	2.09
Miscellaneous	.84	.26	2.00	3.65
	100.00	100.00	100.00	100.00

TABLE 7—BREAKDOWN OF TIME
(Total of 41 jobs*)

	Hours	Per cent
Drilling	6,627.75	51.5
Surveying	946.5	7.3
Tripping	3,002.5	23.3
Reaming	477.75	3.7
Orienting	141.75	1.1
Fishing	241.25	1.9
Circ. and cond. mud	657.00	5.1
Rig repairs	439.50	3.4
Rig service	247.75	1.9
Miscellaneous†	105.5	.8
Total	12,887.25	100.00

*Includes two wells in the Northwest Territories to which no further reference is made in this article. †Coring, logging, waiting, running pipe, etc.

TABLE 8—CHANGES OF DRILLING HOOKUP AND AVERAGE FEET DRILLED PER HOOKUP

Field—	No. of changes*	Changes per well	Average feet per hookup
Pembina	323	17	145.5
Joffre-Burbank	325	21.6	105.5
Joseph Lake	45	15	145.0
Breton	23	11.5	123.0
Over-all avg.		18.3	126.0

*Note that this includes the drilling hookups employed when drilling off the whipstock and when opening up the rathole.

TABLE 9—PENETRATION RATES

(a) Comparison of feet per hour on bottom in the four fields:

	Low	High	Avg.
Pembina	6.1	27.09	13.43
Joffre-Burbank	7.0	23.0	13.00
Joseph Lake	21.9	36.64	32.00
Breton	15.1	18.32	16.10

(b) Comparison of average feet per day per job in the four fields:

	Low	High	Avg.
Pembina	96.1	323.0	194.7
Joffre-Burbank	79.1	324.3	161.89
Joseph Lake	186.8	428.4	310.5
Breton	184.8	245.8	202.0

TABLE 10—COMPARISON BETWEEN ESTIMATED AND TRUE COSTS

Field—	No. of wells	Estimated cost	True cost	Percentage	Avg. cost per well
Pembina	19	$67,651.22	$77,003.84	+13.8	$4,055
Joffre-Burbank	15	58,632.28	62,296.01	+ 6.25	$4,160
Joseph Lake	3	8,464.66	8,011.59	− 5.35	$2,670
Breton	2	5,167.28	5,473.57	+ 5.95	$2,736
Total	39	$139,915.43	$152,785.01	*+ 9.2	

*Over-all difference.

TABLE 11—COMPARISON BETWEEN ESTIMATED AND TRUE NUMBER OF DAYS

Field—	No. of wells	Est.	True	Difference
Pembina	19	231	241	+10
Joffre-Burbank	15	182	212	+30
Joseph Lake	3	23	21	− 2
Breton	2	13	14	+ 1
Total	39	449	488	*+39

*Or 8.7 per cent.

Table 4 shows that in the case of Pembina and Joseph Lake, the average feet per survey has improved noticeably as more jobs were done and more experience gained.

Number of deflecting tools employed. Generally speaking, the fewer deflecting tools employed, the quicker the job will be done and the more the risk of dog legs will be reduced. The average number of whipstocks employed per job in Pembina, Joffre-Burbank fields and Joseph Lake fields is very close (see Table 5); and the over-all average of 2½ tools per job is not excessive. Notice that 13 jobs were performed with only one whipstock and another 13 using two whipstocks. The average is brought up by the two jobs which required eight tools each.

Breakdown of time . . . Tables 6 and 7 summarize the breakdown of time employed in the several fields. Perhaps the most interesting is Table 6 (a) which shows time on a percentage basis. In all cases about 82 per cent of time was accounted for in drilling, surveying, and tripping. This illustrates the importance of keeping to a minimum the number of surveys taken and the changes of drilling hookup. The summarized averages (Table 7) do not vary greatly from the individual summaries in Table 6 (a).

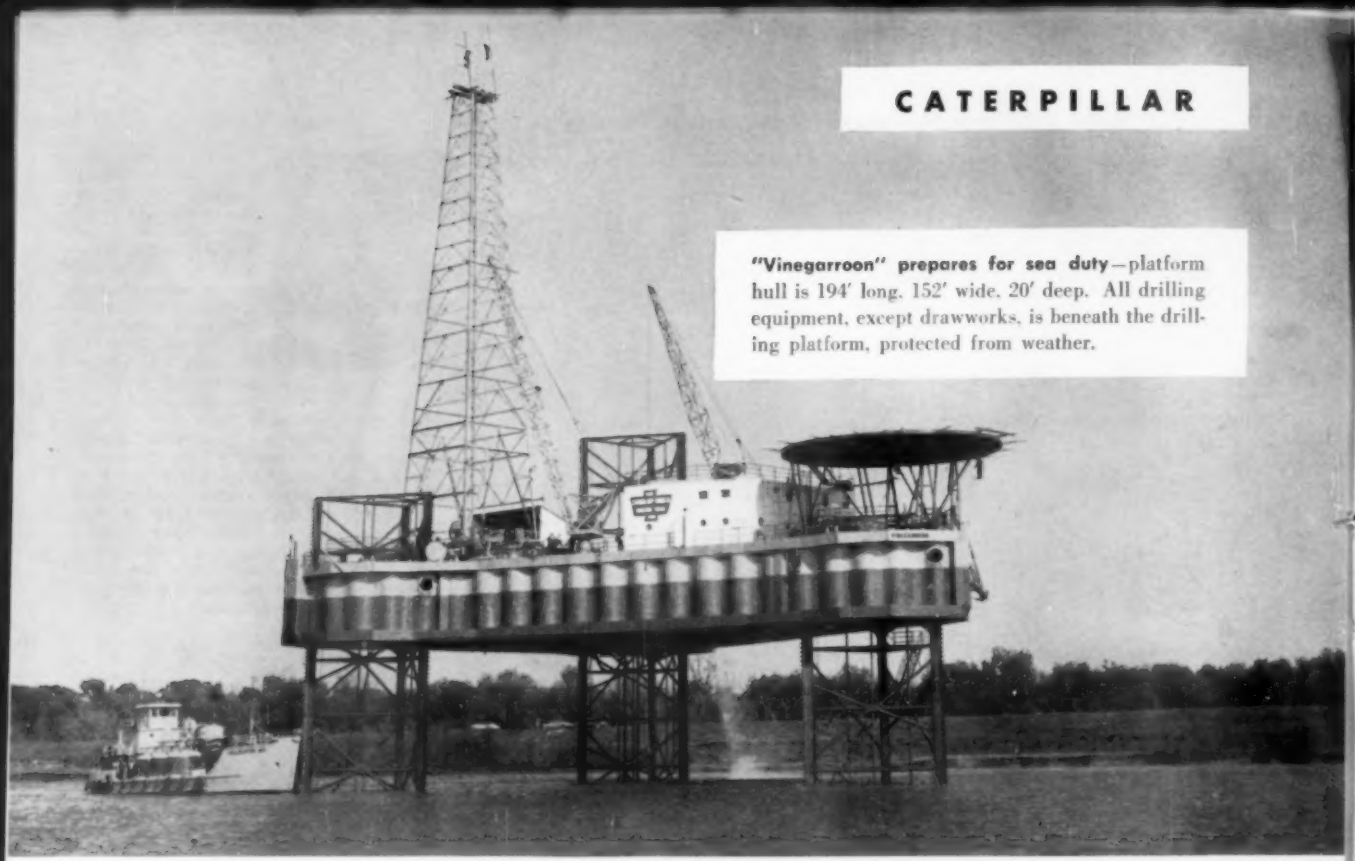
Changes of drilling hookup . . . Table 8 shows the total changes of drilling hookups and the average number of feet drilled per hookup in each field. As the figures include whipstock and hole-opener runs which do not exceed 12 ft. in each case, it will be ap-

TABLE 12—SUMMARY OF AVERAGES

	Controlled footage	Deviation, feet	Maximum angle	Duration, days	Cost
Pembina	2,470	844.65	25°15′	12.7	$4,055.00
Joffre-Burbank	2,285	889.86	27°45′	14.1	$4,160.00
Joseph Lake	2,173	906.23	34°15′	7.0	$2,670.00
Breton	1,414	402.38	22°7½′	7.0	$2,736.50

THE AUTHOR

A. G. G. de Chastelain, vice president, Eastman Oil Well Survey Co., Ltd., Calgary, Alta., is a native of London, England. He took a degree in engineering at London University in 1927 and proceeded to the oil fields in Romania where he stayed until 1940. He was dropped by parachute into Romania in 1943 on a politico-military operation and as a result became persona non grata with the U.S.S.R. authorities and was barred from further entry to Romania. He joined Eastman International Co. in 1953 and has been in charge of Eastman operations in Canada since January 1955. He is analyzing directional drilling and diamond coring data with a view to establishing optimum working conditions in principal Canadian formations.



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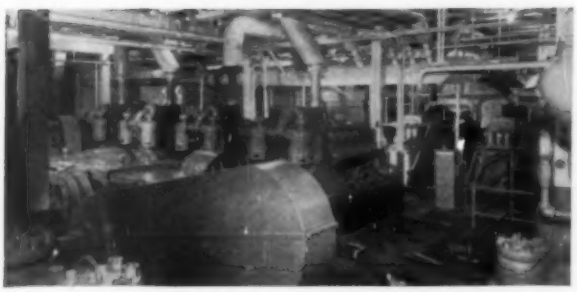
"Vinegarroon" prepares for sea duty—platform hull is 194' long, 152' wide, 20' deep. All drilling equipment, except drawworks, is beneath the drilling platform, protected from weather.

NEW TRIPOD PLATFORM WEATHERS "AUDREY"

The "Vinegarroon" and its seven CAT* Diesel Engines survive hurricane with only minor damage, 15 miles off Cameron, La.



Four Cat D397 Turbocharged Diesels equipped with Twin-Disc torque converters deliver prime power for all drilling operations. Three other D397s (in background) are source of power for lowering and raising the giant legs.

A revolutionary offshore drilling platform withstood the fury of June's destructive hurricane off Cameron, La. With power supplied by seven Caterpillar* Turbocharged D397 Diesels, it was back in operation in days.

The mobile platform is the revolutionary "Vinegarroon"—a 2500-ton, triangular floating barge equipped with three 145-foot legs. The rig, operated by Zapata Off-shore Co., Houston, Texas, was built by R. G. LeTourneau, Inc., of Longview, Texas.

Source of power for the giant legs—made of truss-braced tubular steel—are three D397 Turbocharged Diesels, each rated at 650 HP (maximum output capacity). They drive the generators, which provide the output for 27 electric motors to raise and lower the three gigantic legs. One of the diesel-generator units supplies power for ship's service, as well as acting as standby for the legs.

Feet of the big legs are spud tanks 35 feet in diameter and 32 feet high which fill with water. All three legs can be moved simultaneously.

Once in position, four other Cat D397 Turbocharged Diesels equipped with Twin-Disc torque converters go to work. Through mechanical compounds, these powerful engines drive three mud pumps and an Oilwell model 96 drawworks.

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TABLE 13—PRODUCTION DATA

Field—	Avg. vertical depth	Producing zone
Pembina	4,992.11	Cardium
Joffre-Burbank	4,955.58	Viking
Joseph Lake	3,260.02	Viking
Breton	4,170.88	Cardium

preciated that the average footage per hookup while drilling, is considerably greater than indicated. As more information on drilling tendencies in any one field become available, the number of changes in drilling hookup is reduced and the speed of the drilling operation is increased.

Drilling rates . . . Feet per hour on bottom combined with the amount of time spent on bottom, is perhaps the best measure of the relative efficiency and speed of a job in a particular field and for a given amount of controlled footage. Table 9 (a) summarizes the values of feet per hour on bottom; Figs. 3 and 4 illustrate the manner in which the factor varies with the amount of controlled footage in the Pembina and Joffre-Burbank fields. The high value of feet per hour on bottom in Joseph Lake will be noted.

Data on feet per day are shown in Table 9 (b). These vary from a low of 161.89 ft. in Joffre-Burbank, to a high of 310.5 ft. in Joseph Lake.

Estimated and true cost . . . Table 10 provides a summary of and a comparison between estimated and true costs; Fig. 5 illustrates the manner in which each job varied from the estimate. Compared with the figures published in January 1957, there has been a great improvement as is clearly shown in the diagram. On 39 jobs the true costs were within 10 per cent of the estimate while in three of the four fields they were closer to 5 per cent.

Estimated and true number of days . . . This comparison is shown in Table 11. True time taken was 8.7 per cent greater than estimated but, as in the case of costs, the average is affected by a few early jobs which were well over average.

Summary of averages . . . Table 12 provides the characteristics, duration, and cost of the average job in the four fields under review; Table 13 provides average true vertical depth and producing zone.

As more and more of the known inaccessible locations in Canada become due for drilling, so will the application of directional drilling be increased. The efficiency of controlled directional operations makes steady improvement and costs are gradually decreasing. **End.**

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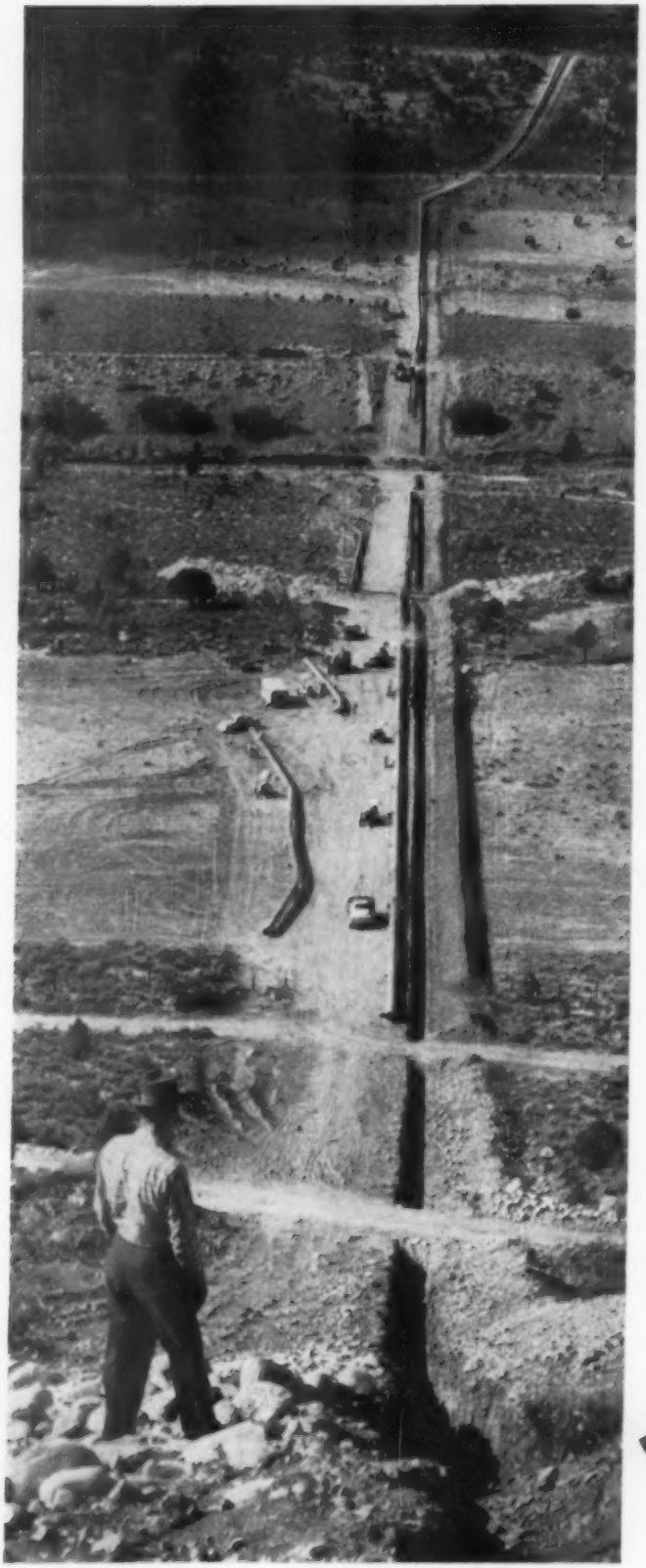

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RED RIVER CROSSING, 10 miles south of Winnipeg, is 650 ft. wide, the biggest on the western section of Trans-Canada pipeline. Three draglines are shown trenching the river bed.

Trans-Canada—world's longest gas line

Thirteen Spreads Speed New Artery

THROUGH the farmlands of Saskatchewan and Manitoba, the rugged bush and rock country of eastern Manitoba and northwestern Ontario and along the more heavily populated Toronto-Montreal line, better than 3,000 pipeliners are hard at work on the year's construction schedule for Trans-Canada Pipe Lines, Ltd. This natural-gas line from Alberta to Toronto and Montreal when completed will be 2,294 miles long, the longest natural-gas line in the world.

The 1957 construction schedule will total 1,064 miles of pipe, with 13 spreads at work. Together with the 230 miles of pipe laid in the short 1956 season, this year's work will see better than 60 per cent of the project completed.

During 1956, two contractors laid 230 miles of 34-in. pipe, from Burstall, on the Alberta-Saskatchewan border, to Pense, about 15 miles west of Regina. The United States steel strike curtailed operations in the early fall but the resumption of steel deliveries kept the contractors on the job until well into November. Also during the winter, two river crossings were installed, at Miniota, Man., and Portage La Prairie, Man.

Thirteen contractors at work . . . This year five contractors are building the line from Pense to the Manitoba-Ontario border, a distance of 441 miles, four contractors are working from the Manitoba-Ontario border to Port Arthur, a distance of 315 miles, and four contractors will cover the 308 miles from Toronto to Montreal.

The 34-in. pipe to be laid this year runs from Pense to a point about 10 miles southeast of Winnipeg. The contractors include Mannix, Ltd., section three; Dutton-Williams Bros., section four; Price-Poole Construction, section five; Canadian Bechtel, section six. Section seven, from Winnipeg to the Manitoba-Ontario border, begins the 30-in. pipe and is being built by Majestic Contractors, Ltd.

Construction from the Manitoba-Ontario border to Port Arthur will be by Northern Ontario Pipe Line Crown Corp., under Trans-Canada's supervision. The contractors include Dutton-Williams Bros., Morrison-Shivers, Majestic Contractors, and Houston Contracting. Contractors for the Toronto-Montreal section are Dutton-Williams, Oklahoma Pipe Line Constructors, and Grayco Constructors, Inc.

The western section of the line through Saskatchewan and western Manitoba largely travels rolling prairie farm lands, with one section in Saskatchewan generously sprinkled with water holes and sloughs, and another in Manitoba encountering rolling sand dunes.

In eastern Manitoba and northwestern Ontario the terrain is almost exclusively granite rock, timber, and lakes of the Canadian shield. Heavy-rock excavation is required over about 20 per cent of the route in this area. Water and muskeg overlie about 15 per cent of the mileage. Longest water crossing in this section will be near Kenora where two islands will be anchor points for the ½-mile crossing. In all cases the pipe will be buried in the bottoms of rivers and lakes.

The Trans-Canada program calls for the delivery of Alberta natural gas to Regina, Winnipeg, and several smaller points between the two by this fall. Contractors were slowed down by heavy rains, mud, and impassable roads early in the season but the weather has improved considerably, enabling them to make good headway. First construction started near Pense on May 9 and by May 15 first pipe was in the ditch and cov-

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ered, and the right-of-way ready for spring planting of farm crops.

Pipelines bring industry . . . The completion of the Trans-Canada project will see the beginning of a new Canadian industry in which the fuel and raw material resources of the west will be linked with the homes and industries of central and eastern Canada. Already the portents are beginning to emerge. New industries are being planned or studied and others are being expanded in Regina, Winnipeg, Kenora, and the Canadian lakehead as a result of the early arrival of natural gas.

About 200 Canadian communities will enjoy the benefits of natural gas for the first time as a result of this project, and the economic effects will be tremendous. Apart from the $378,000,000 cost of the project, Alberta gas producers will receive more than $650,000,000 for their gas; a new Alberta petrochemical industry initially will call for expenditures amounting to about $100,000,000, and distribution companies, either newly formed or planning expansion, will spend better than $250,000,000.

A new era for the Alberta gas producers has been forecast. Alberta's gas reserves now are officially estimated at 18.3 trillion cubic feet, (with 4.35 trillion cubic feet allocated to Trans-Canada over the next 25 years) and one authority forecasts reserves of 42 trillion cubic feet by 1986. The present reserves have been largely established while producers have been searching for oil. With the completion of the Trans-Canada project and smaller lines producers are already starting initial work in an all-out search for gas, as apart from oil and gas incidentally.

The market for gas from the Trans-Canada line also has expanded beyond figures thought possible only 5 years ago. Initially the line will deliver 300 million cubic feet of natural gas per day, but is designed to carry a maximum of 750 million cubic feet per day. It is anticipated that the Canadian market alone will be taking 180 billion cubic feet of gas per year in the fifth year of operation.

Trans-Canada currently has sales contracts to supply such cities as Regina, Winnipeg, Kenora, Fort William, Port Arthur, Toronto, Montreal, the area of southwestern Ontario covered by Union Gas Co. of Canada, and many other areas covered by the distribution companies with whom the contracts are signed.

Trans-Canada also has a contract with Tennessee Gas Transmission Co. and its subsidiary, Midwestern Gas Transmission Co., whereby Midwestern will purchase at Emerson, Man., 200 million cubic feet of gas daily and another 200 million cubic feet daily if and when it is available. Midwestern's request to build and operate a pipeline to handle this purchase currently is before the FPC.

Thus the pipeliners working across Canada in the summer of 1957 are heralding the start of a new industry. One which will create tens of thousands of new jobs, through which will be distributed hundreds of millions of dollars in wages each year; new purchasing power spread over the length of Canada, and a new industrial awakening.

This industry will not mean just a short-term boom. It will be a long-term continuing benefit to Canada. As the initial peak activity in building of the pipeline, distribution systems and new and expanded industrial plants is completed, these construction jobs will give way to many thousands of permanent operating, maintenance, and factory jobs. **End.**

PIPELINING THROUGH GRANITE in eastern Manitoba requires tons of explosives for blasting ditch. Still more blasting is in order on this spread to get ditch 4½ ft. deep.

DOUBLE-JOINTING along right-of-way speeded work on this Dutton-Williams Brothers, Ltd., spread between Wolseley, Sask., and Miniota, Man. Double-jointing of 40-ft. sections of 34-in. strung during the winter was started as soon as the ground dried in the spring.

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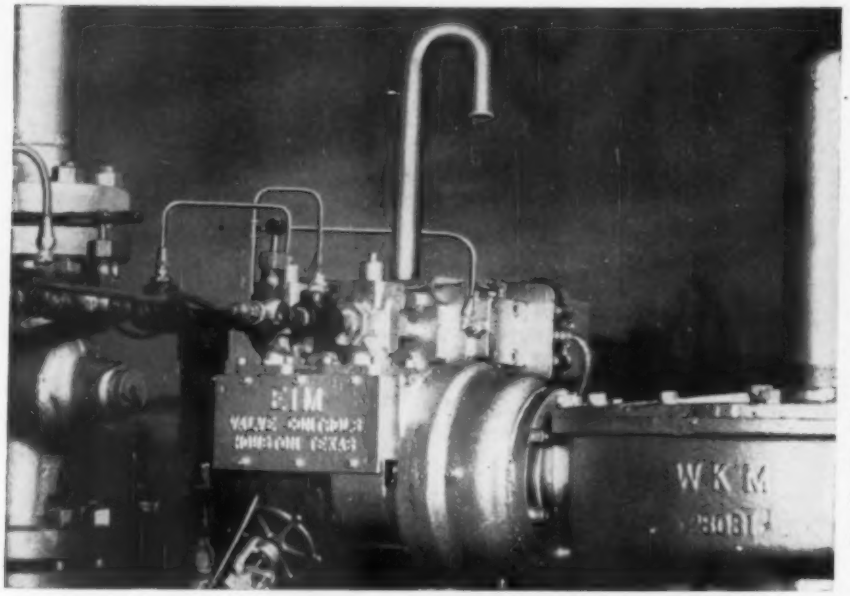

The G2 takes its source of power from the medium in the transmission line, without any pressure reduction. There are no small parts. It's a compact unit with all piping, valving and controls integrally arranged. Field piping is kept to a minimum. Actually, only one small line from the pressure source to the valve control is required.

Some 300 Type G-12 valve controls are employed in Texas Eastern Transmission Company's stations and along the line.

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Canadian Refinery-Construction Plans

Your refinery construction report regularly appears in the last Journal issue of each month. This feature appears 1 week early this month, to coincide with the Canadian issue.

B

British American Oil Co., Ltd. is adding a 4,000-bbl. per day Atlantic Catformer at Edmonton, Alta. Lummus Co. will complete the unit by end of 1957.

At Clarkson, Ont., crude capacity will be upped 40,000 bbl. per day, and capacity of vacuum unit charging topped crude 22,200 bbl. per day by late 1957. M. W. Kellogg has contract.

At Port Moody, B. C., a 20,000-bbl. per day plant will be completed by Canadian Kellogg Co., Ltd., by late 1958. It will include atmospheric and vacuum crude distillation, Orthoflow, Atlantic Catforming, catalytic cracking, alkylation, and hydrogen treating.

British Petroleum, Ltd., plans a $30,000,000, 30,000-bbl. per day plant at Ville d'Anjou, Que. It will include a 15,000-bbl. daily catalytic cracker, a 9,000-bbl. daily catalytic reformer, a hydrogen-treating unit, and an alkylation unit.

C

Canadian Husky Oil, Ltd., has indefinite plans for crude expansion at Lloydminster, Alta.

At Fort William, Ont., a $700,000 crude-expansion program starts this fall. It will include construction of a Husky-developed, 1,000-bbl. per day diesulformer. Poole-Pritchard, Ltd., has contract.

Crude expansion is planned for Moose Jaw, Sask., but plans are incomplete.

Canadian Petrofina, Ltd., will increase capacity at Montreal 10,000 bbl. per day.

Cities Service Oil Co., Ltd., has under way a $22,000,000 plant at Toronto. Designed for ready expansion from initial 20,000-bbl. per day capacity, it will include two-stage atmospheric and vacuum distillation (vacuum-stage capacity will be 7,600 bbl. per day), a 13,300-bbl. per day U.O.P. fluid catalytic cracking unit, a 3,110-bbl. per day Sinclair-Baker catalytic reformer, and a hydrodesulfurization unit. C. F. Braun Co. of Canada, Ltd., has contract and plans to complete the plant December 1958.

I

Imperial Oil, Ltd., will complete a 5,800-bbl. daily Powerformer at Ioco, B. C., December 1957. A prefractionator and Hydrofiner will be added. Cost will be $4,000,000. Canadian Bechtel, Ltd., has contract.

At Calgary, Alta., plant capacity will be expanded to 18,500 bbl. per day in a $17,000,000 expansion and modernization program.

At Winnipeg, Man., crude capacity will be upped 2,650 bbl. per day, and fluid catalytic cracking 1,500 bbl. per day (23 per cent recycle) in last half 1957. A 3,150-bbl. daily Powerformer will be completed October 1957 by Foster Wheeler Corp.

M

McColl-Frontenac Oil Co., Ltd., will complete a 10,000-bbl. daily Hydrotreating unit at Montreal East, Que., late 1957.

P

Pacific Petroleums, Ltd., and **Phillips Petroleum Co.** are building a $15,000,000 refinery at Taylor, B.C. It will include distillation, catalytic desulfurization and reforming, dehydrogenation, butane isomerization, and alkylation. Pacific will operate the plant.

R

Regent Refining (Canada), Ltd., will increase crude capacity 20,000 bbl. per day, add an 8,000-bbl. daily vacuum unit to charge topped crude, an 11,300-bbl. daily fluid catalytic cracker (61.5 per cent recycle), and a 730-bbl. per day catalytic polymerization unit at Port Credit, Ont., by summer 1957. Engineering and design are by Procon (Canada), Ltd., and U.O.P.

Royalite Oil Co., Ltd., will complete a 1,000-bbl. daily Platformer and a 1,500-bbl. daily Unifiner at Kamloops, B. C., October 1957.

At Saskatoon, Sask., crude capacity will be increased 500 bbl. daily by August 1957.

At Mildred Lake, Alta., a $50,000,000, 20,000-bbl. daily separation plant to process Athabasca oil sands will be completed in 1960, by Caribou Engineering Co.

S

Shell Oil Co. of Canada, Ltd., will add a $3,000,000, 1,500-bbl. daily sulfuric acid alkylation unit at Montreal East, Que., in 1958. Refinery Engineering, Ltd., has contract.

At Toronto, a 20,000-bbl. per day plant will be completed in 1960. Plans for the various process units have not yet been firmed up. Construction will probably start in 1958.

W

Wainwright Producers & Refiners, Ltd., will complete a 3,000-bbl. daily gas-oil cracking unit at Wainwright, Alta., fall 1957. A 600-bbl. per day Platformer, a Unifiner, and a 50-bbl. daily catalytic polymerization unit are planned for 1957.

HOW BELL SYSTEM COMMUNICATIONS SERVE THE PIPELINE INDUSTRY

"Our dispatching control is more efficient now that our stations are remotely controlled"

—W. H. Krammes, superintendent of central transmission, Southern California Gas Co.

Bell System remote metering and control channels have enabled Southern California Gas to convert many distribution stations to remote operation. Dispatching control is now more efficient than before the conversion was made.

"To supply a big area like Los Angeles, you have to react fast in case of a load change or pressure drop," says W. H. Krammes, chief of central transmission.

"When our stations were attended, we'd often have a ten-minute lag between a dispatcher's order and its execution. The station attendant would have to run back and forth checking meters, then relay the readings to the dispatcher.

"Today, with Bell System channels for remote metering and control, it's practically instantaneous. The dispatcher reads the telemeter, pushes a button and valves are operated at the remote station."

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Pipeline Patrol

... Report on Construction

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way.

U.S. Crude-Oil Pipelines

• **Belle Fourche Pipeline Co.**
Project: 30 miles of 6-in. from Donkey Creek pool to Fiddler Creek pool in northeastern Wyo. Will later build a line from Fiddler Creek to connect with Butler Pipe Line Co. near Osage, Wyo.
Status: Planned.

• **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.)
Project: Line from lower Delaware Bay to Philadelphia.
Status: Long range plans.
Completion: 1960.

• **C.A.T.C.** (Continental, Atlantic, Tidewater, Cities Service Production)
Project: 19 miles of 12-in. from Grand Isle, La., to Platform A in Block 47 field in Gulf of Mexico, plus four 5-mile sections of 8-in. to three other platforms in Block 47 and one in Block 40.
Status: Under way.
Contractor: **Marine Gathering Corp.**
Completion: September 1, 1957.

• **Four Corners Pipe Line Co.** (Shell, Standard of Calif., Continental, Gulf, Richfield, Superior)
Project: 635 miles of 16-in. from Aneth field in southern Utah to Los Angeles, 86 miles of 12-in. from New Mexico's Bisti field to Red Mesa station 35 miles southeast of Bluff, Utah, and 3 miles of 6, 8, 10-in. feeder lines from other fields in New Mexico and Utah. Will be operated by Shell Pipe Line.
Status: Under way.
Contractor: **A. P. Vaughn Construction Co.** and **Potashnick Construction Co.** have 170 miles of 16-in. from Aneth field to Cameron, Ariz. **R. H. Fulton Construction Co.** has 98 miles of 16-in. from Cameron to Seligman, Ariz., and 217 miles of 16-in. from the Colorado River to Olive, Calif.
Completion: End 1957.

• **Great Northern Railway Co.**
Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Montana and North Dakota, to Clearbrook or St. Paul, Minn.
Status: Under study.
Contractor: **Pipe Line Technologists, Inc.** has contract for feasibility study to be finished July or August 1957.

• **Interstate Oil Pipe Line Co.**
Project: 5 miles of 4-in. from South Bosco field, and 5 miles of various size from Church Point field, La., to present main line.
Status: Proposed

• **Magnolia Pipe Line Co.**
Project: 24 miles of 20-in., 20 miles of 12-in., 83 miles of 16-in. from Corsicana to Clyde, Tex.
Status: Under way.
Contractor: **H. B. Zachry Co.**
Completion: November 1, 1957.
Project: 120 miles of 16-in., 4 miles of 12-in. from Clyde to Midland, Tex.
Status: To start September 15, 1957.
Contractor: **O. R. Burden Construction Corp.**
Completion: December 31, 1957.

• **Muskegon Pipe Line Corp.** (Aurora Gasoline Co., Service Pipe Line Co.)
Project: 165 miles of 10-in. from Griffith, Ind., to Muskegon, Mich.
Status: Under way.
Contractor: **Midwestern Constructors, Inc.**
Completion: Late 1957.

• **Northwest Pipeline Corp.**
Project 80 miles of 8-in. and 300 miles of 10-in. crude and products line from Four Corners area to Salt Lake City.
Status: Proposed.

• **Offshore Gathering Corp., Houston.**
Project: 364 miles of mostly 20-in. in Gulf of Mexico off Louisiana. (Dual line.)
Status: Proposed.

• **Oil Field Pipe Line, Inc.**
Project: 200 miles 8 and 12-in. line from near Elkhart, to Ellinwood, Kans.
Status: Proposed.

• **Pasotex Pipe Line Co.**
Project: 58 miles of 20-in. between Wink and El Paso, Tex.
Status: Under way.
Contractor: **R. H. Fulton & Co.**
Completion: September 1, 1957.

• **Salt Lake Pipe Line Co.**
Project: 93 miles of 10-in. loops from Rangely, Colo., to Salt Lake City.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.** has 93 miles between Rangely field and Salt Lake City.
Completion: December 1, 1957.

• **Shell Oil Co.**
Project: Undetermined length of 3, 4-in. in South Louisiana.
Status: Under way.
Contractor: **Brown & Root, Inc.,** W. P. Stanley, spread superintendent, office at Buras, La.
Completion: September 30, 1957.

• **Sinclair Pipeline Co.**
Project: 150 miles of 20-in. from Teague, Tex., to Houston.
Status: Planned for 1958.
Completion: 1958.

• **Skelly Oil Co.**
Project: 38 miles of 8-in. extension of its gathering system into southern Kiowa County, Kansas.
Status: Planned.
Completion: Early fall 1957.
Project: 50 miles of 12-in. to replace partially looped 6, 8-in. line between Cunningham and Burton, Kans.
Status: To start as soon as pipe is received.
Completion: Late 1957.

• **Southern Kansas Pipeline, Inc.**
Project: 200 miles of 6 to 10-in. in Kans. from southwestern Meade County to 10 miles north of Arkansas City.
Status: Proposed. Request filed with Kansas Corporation Commission for permit.

• **Tecumseh Pipe Line System** (Sinclair Pipe Line, Ashland, Pure)
Project: 201 miles of 20-in. between Griffith, Ind., and Cygnet, Ohio.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.** and **Morrison Construction Co.**
Completion: September 1957.

• **Texas-New Mexico Pipe Line Co.** (Sinclair, Texas Co., Tidewater, Empire)
Project: 515 miles of 16-in. from southeast corner of Utah to Jal, N. M.
Status: To start late 1957.
Contractor: Survey contracts went to **J. V. McCoy,** Houston, and **E. H. Schmidt and Associates,** Tulsa.
Completion: 1958.

U.S. Products Pipelines

• **Alaska-Yukon Refiners & Distributors, Ltd.**
Project: Two lines: one 150 miles from Haines to Haines Junction, Alaska, linking with government Canol line; another from Fok Junction, on Canol line, to Anchorage.
Status: Proposed.
Completion: 1959.

• **American Pipe Line Co.**
Project: Line from Gulf Coast to New York City. Has ODM approval to amortize 40 per cent of cost with fast writeoff.
Status: Proposed.

• **Buckeye Pipe Line Co.**
Project: Conversion of 32 miles of 8-in. between Mantua and Youngstown, Ohio.
Status: Planned.
Contractor: Company will do own work.
Completion: November 1957.
Project: 70 miles of 8-in. from Wayne to vicinity of Durand, Mich.
Status: Under way.
Completion: Early 1958.
Project: 60 miles of 10-in. from Port Everglades, Fla., to Miami's International Airport.
Status: Under way.
Contractor: Buckeye will do own work.

• **Cities Service Pipe Line Co.**
Project: 30 miles of 6-in. ethylene line from Lake Charles. La., to Orange, Tex.
Status: Under way.
Completion: October 1, 1957.
Project: 168 miles of 6-in. L.P.G. line from East Chicago, Ind., to Lowell, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.** has 98 miles from Lowell to South Bend, Ind., Robert Hively, spread superintendent, office at Ada, Mich. **M. L. Hulcher Co., Inc.** has 53 miles from South Bend to East Gary, Ind.
Completion: September 1957.

• **El Paso Natural Gas Co.**
Project: 11 miles of 4-in. L.P.G. from Snyder Line to South Andrews Plant, Tex.
Status: Planned
Project: 240 miles of 6-in. from Odessa to El, Paso, Tex.
Status: Planned.
Contractor: **Pipeline Engineering Co.** has design and engineering contract. **Coates Field Service, Inc.** has right-of-way acquisition and claims settlement contracts.
Completion: Early 1958.

• **Emerald Pipe Line Corp.**
Project: 120 miles of 6-in. from Sunray, Tex., to Tucumcari, N. M.
Status: Plannned.
Completion: December 1, 1957.

• **Florida Pipeline & Storage Co.**
Project: 67 miles from Everglades, Fla., to Homestead Air Force Base south of Miami.
Status: Under way.
Contractor: **Fish Service Corp.**
Completion: December 1957.

• **Great Lakes Pipe Line Co.**
Project: 93 miles of 8-in. from south of St. Paul to Eau Claire, Wis.; 68 miles of 12-in. from Great Lakes intersecting point with Badger Pipe Line to Chicago.
Status: Under way.
Contractor: **R. H. Fulton & Co.** has the 8-in. **Midwestern Contractors, Inc.** has part of the 12-in.
Completion: Late 1957.
Project: 15 miles of 6-in. from Lincoln, Neb., to Lincoln air base.
Project: 140 miles of 8-in. from Minneapolis to Superior terminals.
Status: To start September 1, 1957.
Contractor: **Laco Pipeline Contractors, Inc.**

Pipeline Patrol

Project: 34 miles of 12-in. from Tulsa to Barnsdall, Okla., replacing 12, 8-in. lines.
Contractor: **Midwestern Constructors, Inc.**
Completion: Late 1957.

Project: 14 miles of 8-in. from Coffeyville to Independence, Kans., replacing 4-in. line.
Contractor: **Jess Whitlow Pipe Line Service**

Project: 11 miles of 8-in. from 10 miles east of Donahue, Iowa, to terminals at Bettendorf, Iowa.
Contractor: **R. T. Perry Pipe Line Construction.**

- **Laurel Pipeline Co.** (Gulf Refining Co., Sinclair Pipe Line Co., The Texas Co.)

Project: 100 miles of 24-in. and 340 miles of line graduating down to 14-in. at the west terminus, from Philadelphia to Cleveland.
Status: To start early 1958.
Completion: 1958.

- **Leonard Refineries, Inc.**

Project: 43 miles of 6-in. from Alma to Lansing, Mich.
Status: Planned.
Completion: Late fall 1957.

- **Northwest Pipeline Corp.**

Project: 80 miles of 8-in. and 300 miles of 10-in. products and crude line from Four Corners area to Salt Lake City.
Status: Proposed.

- **Odessa Butadiene Co.**

Project: 240 miles of 6-in. from Odessa to El Paso, Tex.
Completion: March 1, 1958.

- **Ohio Oil Co.**

Project: 350-miles of 12-in from Wood River, and Robinson, Ill., to Chicago.
Status: Work to start fall 1957.
Contractor: **Panama-Williams Corp.** has 84 miles from Robinson to Champaign.
Completion: 1958.

- **Salt Lake Pipe Line Co.**

Project: 80 miles of 8-in. loops from Adams to Ontario, Ore.
Status: Under way.
Contractor: **Hallmac Construction Co.**

- **Shamrock Pipe Line Corp.**

Project: 14 miles of 4-in., 30 miles of 8-in. in Hansford and Moore counties, Tex.
Status: Under way.
Contractor: **H. A. McGinnis Construction Co.** has 4-in.
Completion: September 15, 1957.

- **Southern Pacific Pipe Lines, Inc.**

Project: 100 miles of 10-in., 80 miles of 8-in., and 125 miles of 6-in. between Richmond, Calif., and Fallon, Nev.
Status: Under way.
Contractor: **River Construction Corp.** has 84 miles of 8, 10-in. from Richmond to Stockton, Calif., completed. **Hood Construction Co.** has 58 miles of 10-in. from Lodi to Roseville, Calif., completed. **Engineers, Limited Pipeline Co.** and **Joe E. Young Pipe Line Construction Co.** have 180 miles of 6 and 8-in. between Rocklin, Calif., and Fallon, Nev.
Completion: September 1, 1957.

- **Texas Eastern Transmission Corp.**

Project: 1,168 miles of 20-in. from Baytown, Tex., to Moundsville, W. Va., conversion from gas.
Status: Under way.
Completion: September 1, 1957.

Project: 231 miles of 14-in. from Seymour, Ind., to Chicago.
Status: Under way.
Completion: Fall 1957.

- **Trust Pipe Line Co.** (Cosden Petroleum)

Project: 138 miles of 6-in. from Hawley, near Abilene, to Wichita Falls, Tex.
Status: Under way.
Contractor: **Holder Construction Co.**
Completion: October 15, 1957.

- **Underground Storage & Exploration, Inc.**

Project: 393 miles of 12-in. L.P.G. line from Moundsville, W. Va., to Newark, N. J., plus 95 miles of 6, 8-in. laterals to Mauch Chunk, Pa., and to Philadelphia.
Status: Proposed.

- **Union Oil Co. of California**

Project: 815-mile line from Rifle, Colo., to Los Angeles refining area, to carry products from its Rifle shale-oil plant.
Status: Proposed.

U.S. Natural-Gas Pipelines

- **Arkansas Louisiana Gas Co.**

Project: A 300-mile line, plus gathering lines, from Tex.-La. coastal area to northern La., to connect with present system.
Status: Long-range plans.

- **Atlantic Seaboard Corp.**

Project: 6 miles of 26-in. from Petersburg to Moorefield, W. Va.
Status: Has temporary FPC approval.
Contractor: **Williams-Austin Contsruction Co.**
Completion: November 1957.

- **Carolina Pipeline Co.**

Project: 177 miles of 2, 3, 4, 6, 8, and 10-in. between Blacksburg and Camden, S. C.
Status: Under way.
Contractor: **Panama-Williams Corp.** has construction contract. **Coates Field Service, Inc.** has right-of-way acquisition and claims settlement contract.

- **Central Hudson Gas & Electric Corp.**

Project: 46 miles of 10-in. from Albany to Kingston, N. Y.
Status: Under way.
Contractor: **Williams-Austin Construction Corp., O. L. Martin and Ralph Gaddy,** supts., office at Catskill, N. Y.
Completion: December 1, 1957.

- **Cities Service Gas Co.**

Project: 8 miles of 16-in., 20 miles of 8-in., 20 miles of 6-in., and 20 miles of 4-in. field lines in Barber County, Kansas.
Status: Approved. Under way.
Contractor: **Vaughn & Taylor Construction Co.**

Project: 3 miles of 12-in., 8 miles of 10-in., 4 miles of 8-in., 8 miles of 6-in., and 37 miles of 4-in. field lines in Eureka Field, Okla.
Status: Approved. Under way.
Contractor: **Prairie Construction Co.**

Project: 64 miles of 6 to 30-in. in Leavenworth and Anderson counties, Kans., Cass County, Mo., and Oklahoma County, Okla.
Status: Planned.

Project: 75 miles of 30-in. from Independence to near Welda, Kan.
Status: Pending FPC approval.

Project: 7 miles of 30-in. from Merriam to Kansas City, Kans.
Status: Under way.
Contractor: **Prairie Construction Co., Inc.**
Completion: September 15, 1957.

- **Coastal States Gas Producing Co.**

Project: A 20-mile gathering system from the Rock Island area of Colorado County, Tex., to the United Gas Corp. system.

- **Coastal States Gas Producing Co.** and **Southern Coast Corp.**

Project: 45 miles of 2 to 10-in. in Bee County, Tex. to connect presently shutin fields with Texas Eastern Transmission Corp.'s system.
Status: Planned.

- **Coastal Transmission Corp.**

Project: 575 miles of 12, 20, 22, 24-in. main line and 414 miles of 2 to 14-in. gathering lines between McAllen, Tex., and Baton Rouge, La.
Status: Under way.
Completion: January 1, 1958.

- **Colonial Natural Gas Corp.**

Project: Two systems; one between Houston-Lake Charles area and Miami, Fla.; one in the Carolinas and Georgia.
Status: Proposed.

- **Colorado Interstate Gas Co.**

Project: 1957 program . . . 66 miles of 30-in., 40 miles of 34-in., 109 miles of 26-in., and 100 miles of 24-in. from Springfield, Colo., to Pueblo, Colo; 345 miles of 30-in. from Kit Carson, Colo., to Beatrice, Neb.; 50 miles of 22-in. from Laverne to Hooker, Okla.; 24 miles of 22-in. Panhandle field looping.
Status: Pending FPC approval. Has temporary approval for the 50 miles in Okla.

- **Eastern Shore Natural Gas Co.**

Project: 34 miles of 8-in. and 90 miles of 6-in. from connection with Transcontinental Gas Pipe Line Corp. in Maryland, across entire length of Delaware to Salisbury.
Status: Pending FPC approval.

- **East Ohio Gas Co.**

Project: 90 miles of 24-in., and 23 miles of 30-in. from Richfield to Summerfield, Ohio.
Contractor: **Sharman, Allen, Gay & Taylor, Inc.,** James Adams, spread superintendent, office at Wadsworth, Ohio. **Coates Field Service, Inc.** has right-of-way acquisition and claims settlement contract.
Completion: November 1957.

- **Edison Securities Co.**

Project: 130 miles of 30-in. from San Joaquin Valley fields to Wilmington, Calif.
Status: Being contested by Southern California Gas Co., Southern Counties Gas Co., and Pacific Lighting Gas Supply Co.
Contractor: **Bechtel Corp.**

- **El Paso Natural Gas Co.**

Project: 27 miles of 34-in. San Juan main line loops.
Status: Under way.
Completion: September 1957.

Project: 81 miles of 18-in. and 13 miles of 20-in. from Panoma Plant, Gray County, to Dumas Plant, Moore County, Texas.
Status: Under way.
Contractor: **R. H. Fulton & Co. Coates Field Service, Inc.** has right-of-way acquisition and claims settlement contract.
Completion: November 1, 1957.

Project: 177 miles of 20-in. from Sonora Plant, Sutton County, to Plains Plant, Yoakum County, Texas.
Status: Planned. Filed for FPC permit.
Completion: January 1958.

Project: 74 miles of 30-in. Permian-San Juan main line loops.
Status: Planned. Filed for FPC permit.
Completion: January 1958.

Project: 216 miles of 6 to 34-in. and 533 miles of various size in Ariz., Tex., N. M.
Status: Filed for FPC permit.

Project: 47 miles of 30-in. from proposed Lindrith, N. M., plant to proposed Chaco, N. M., plant.
Status: Under way.
Contractor: **Foutz & Bursum Construction Co.**
Completion: 1957.

Project: 38 miles of various size line to make additional gas available at the McElroy-Wilshire plant near Crane, Tex.

Project: 500 miles of 30-in. from Twin Falls, Idaho to California border near Las Vegas, Nev.
Status: Planned.
Completion: September 1959.

- **Houston Texas Gas & Oil Corp.**

Project: 702 miles of 24-in. from Baton Rouge, La., to Kissimmee, Fla.; 139 miles of 18-in. and 101 miles of 20-in. from Kissimmee to Cutler, Fla.; 642 miles of 3 to 18-in. sales laterals in Florida. Main line to join Coastal Transmission's proposed line from McAllen, Tex., to Baton Rouge.
Status: Under way.
Contractor: **Midwestern Constructors** has the 702 miles of 24-in.; **Harbert Construction Corp.** has remainder.
Completion: June 1958.

- **Illinois Power Co.**

Project: 6 miles of 6-in. line between Hoffman and Carlyle, Ill., plus distribution lines.
Status: Under way.
Contractor: **Mid-States Construction Co.,**

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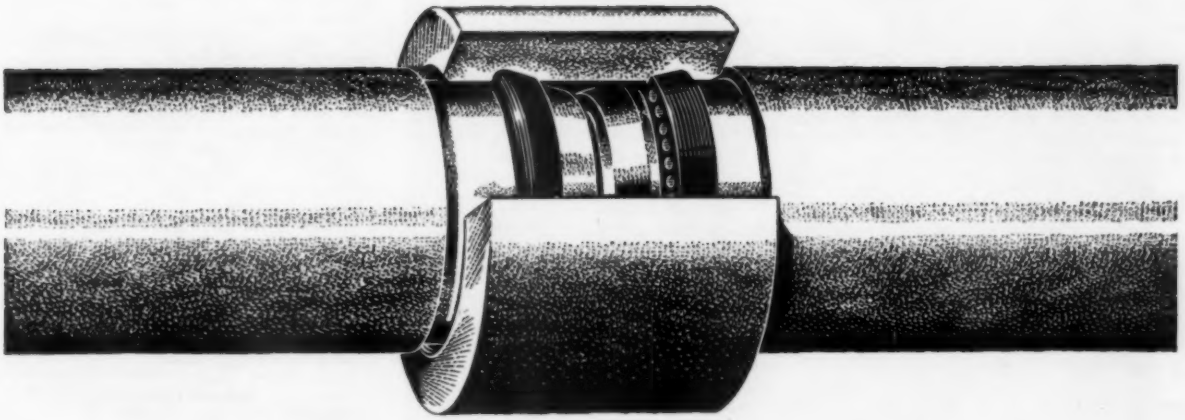

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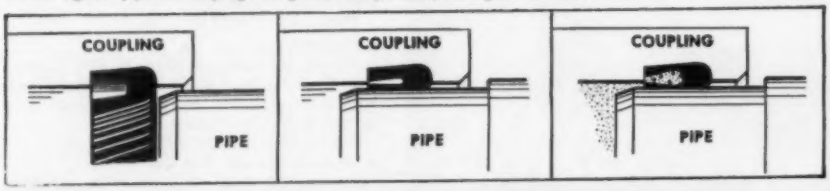

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Pipeline Patrol

H. A. Hane, supt., office at Carlyle, Ill.
Completion: September 1, 1957.

• **Intermountain Gas Co.**
Project: 16 miles of 6-in. from Payette to Weister, Ida.
Contractor: **Hood Construction Co.**, V. H. Bailey, supt., office at Payette.
Completion: September 15, 1957.
Project: 16 miles of 6-in. near Mountain Home, Ida.
Contractor: **Hood Construction Co.**, Sam Shearman, supt., office at Boise.
Completion: September 1, 1957.

• **Iron Ranges Natural Gas Co.**, St. Paul.
Project: 68-mile transmission line and 47 miles of laterals to supply towns on the Mesabi Iron Range, Minn.
Status: Application pending with FPC.

• **Kansas-Nebraska Natural Gas Co.**
Project: 61 miles of various size gathering line in Camerick field, Texas County, Okla.
Status: Approved.

• **Manufacturers Light & Heat Co.**
Project: 50 miles of 10, 12-in. from Waynesburg to Pittsburgh, Pa.; 40 miles of 16-in. and 20 miles of 6 to 12-in. from Corning to Dundee, N. Y.
Status: Under way.
Contractor: **Harford Brothers**, A. M. Harford and Robert Mann, superintendents.
Completion: September 15, 1957.

• **Michigan Consolidated Gas Co.**
Project: 67 miles of 10 and 12-in. between Sears and Travers City, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.**; Floyd Huduall, supt., office at Cadillac, Mich.
Project: 60 miles of 10 and 12-in. between Muskegon and Ludington, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.**, jointly with **J. L. Gentry Construction**; Frank Morris, superintendent, office at Hart, Mich.

• **Michigan Wisconsin Pipe Line Co.**
Project: 46 miles of 24-in. looping of Wisc. main line.
Status: Under way.
Contractor: **G. E. T. Construction, Inc.**
Completion: September 1, 1957.
Project: 21 miles of 4, 6, 12-in. laterals in Wisc., Mich., Mo.
Status: Approved.
Contractor: Various.
Completion: September 1, 1957.

• **Midwestern Gas Transmission Co.**
Project: Will build main line from Portland, Tenn., to Canadian border near Emerson, Man.; 829 miles of 24-in., 109 miles of 16-in., 174 miles of 12-in., plus 648 miles of 3 to 18-in. extensions in Minn. and Wis.
Status: Application pending with FPC.

• **Mississippi River Fuel Corp.**
Project: 54 miles of 26-in. loops between Perryville, La., and Columbia, Ill.
Status: Under way.
Contractor: **Cape Construction Co., Inc.**
Completion: November 15, 1957.

• **Montana-Dakota Utilities Co.**
Project: 28 miles of 12-in. from Fallon County to Dawson County, Montana.
Status: Approved.
Project: 6 miles of 12-in. between Mandan and Bismarck, N. D.
Status: Has temporary approval.

• **Mountain Fuel Supply Co.**, Salt Lake City.
Project: 38 miles of 20-in. to connect with Pacific Northwest Pipeline Corp.'s system in Sweetwater County, Wyoming.
Status: Approved.
Project: Extension of 12-in. line from Ogden to Logan and Brigham City, Utah.
Status: Has applied to Utah Public Service Commission.
Completion: Late 1957.

• **Natural Gas Pipeline Co. of America**
Project: 350 miles of 20 and 26-in. from Jack and Wise counties, Texas, to Fritch, Tex., plus a gathering system.
Status: Under way.
Contractor: **R. H. Fulton & Co.** has Red River crossing in northern Montague County. **Fulton & Brodie, Inc.**, has gathering system. **Eastern Pipeline Contractors**, Dallas has 80 miles of 20-in. from Bridgeport, Tex., to Healdton, Okla. **River Construction Corp.** has 173 miles from Mountain View, Okla., to Fritch, Tex. **H. B. Zachry Co.** has 87 miles of 26-in. between Healdton and Mountain View, Okla.
Completion: January 1, 1958.
Project: 389 miles of 36-in. loops along its line from Beatrice, Neb., to Chicago, to take gas from proposed line of Colorado Interstate Gas Co., and 91 miles of 30-in. loops along parts of its main line.
Status: Application pending with FPC.
Project: 337 miles of 30-in. between Fritch, Tex., and Beatrice, Neb., and 59 miles of 36-in. between Beatrice and Joilet, Ill., along existing system.
Status: Pending FPC approval.
Completion: 1959.

• **New York State Natural Gas Corp.**
Project: 15 miles of 30-in. from Horseheads to Newfield, N. Y.; 31 miles of 20-in. from Harrison to Woodhull, N. Y.; 10 miles of 12-in. from Stockbridge to Oneida, N. Y.
Status: Planned.
Project: 12 miles of 12-in. near Oneida, N. Y.
Status: To start September 15, 1957.
Contractor: **Harford Brothers**, A. M. Harford and Robert Mann, superintendents.
Completion: October 15, 1957.

• **Niagara Mohawk Power Corp.**
Project: 14 miles of 18-in. from Phoenix to Palermo, N. Y.
Status: Under way.
Completion: October 1, 1957.
Project: 196 miles of 2 to 16-in. transmission and distribution mains to service areas in central, eastern and northern New York.
Status: Planned.
Contractor: Various.
Completion: December 31, 1957.

• **North Carolina Natural Gas Corp.**
Project: 630 miles of 2 to 16-in. from near Mooresville, eastwardly across N. C.
Status: To start fall 1957.
Completion: Spring 1958.

• **Northern Natural Gas Co.**
Project: 160 miles of 2, 3, 6, 8-in. branch lines to serve 20 new communities on Aberdeen, S. D., line.
Status: Under way.
Contractor: **Troth Construction Co.**
Project: 73 miles of 20-in. from Savana Creek to Pincher Creek fields in Alberta, Canada; 32 miles of 24-in. from Pincher Creek to Montana border; 1,100 miles of 26-in. from Montana into Minneapolis.
Status: Planned.
Project: 365 miles of main line and 1,090 miles of branch lines to serve communities in Minn., Iowa, S. D., Nebr., Wis.
Status: Filed with FPC March 18, 1957.
Project: 13 miles of 16-in. to replace existing 10-in. line in Hansford County, Texas.
Status: Has temporary FPC authority.

• **Northern Utilities Co.**
Project: 35 miles of 16-in. in Fremont-Natrona County, Wyo., area; 8 miles of 12-in. around Casper; 6 miles of 8-in. from Sand Draw gas field to Beaver Creek field; 12 miles of 6-in. from Beaver Creek field to the system servicing the Riverton-Lander area.
Status: Planned.

• **Offshore Gathering Corp.**, Houston.
Project: 364 miles in Gulf of Mexico off Louisiana: 60 miles of 24-in., 70 miles of 26-in., 234 miles of 30-in. (Dual line.)
Status: Application pending with FPC.

• **Ohio Fuel Gas Co.**
Project: 11 miles of 18-in. and 11 miles of 20-in. from Gibsonburg, Ohio to Toledo; and 30 miles of 24-in. looping from Pavonia to Attica, Ohio.
Status: Approved.
Contractor: **H. L. Gentry Construction Co.** has the 18 and 20-in.
Completion: Gentry work to be completed September 20; remainder November 25, 1957.
Project: 152 miles of line in Ohio: 43 miles of 24-in. from Crawford Station to Utica; 18 miles of 24-in. from Pavonia Station to Line D; 6 miles of 20-in. from Mount Gilead to Claridon; 4 miles of 20-in. near Dayton; 4 miles of 20-in. near South Charleston; 7 miles of 16-in. near Springfield; 6 miles of 20-in. nnear Oberlin; 17 miles of 20-in. from Oak Hill to Symmes Station; 7 miles of 12-in. from Mount Sterling to Bloomingburg; 2 miles of 8-in. near Bellefontaine; 3 miles of 12-in. near Mansfield; 4 miles of 12-in. near Lakeville; 7 miles of 8-in. in Guernsey and Belmont counties.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.** has completed 43 miles of 24-in. from Sugar Grove near Crawford station, to Utica, Ohio, and has 27 miles of 20-in. south from Wellston to complete September 1, 1957.

• **Pacific Gas & Electric Co.**
Project: 138 miles of 34-in. looping of the Topock-Milpitas line.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.**
Completion: December 1, 1957.
Project: 5 miles of 16-in., 160 miles of 12-in., 8 miles of 6-in. from Corning to Eureka, Calif.
Status: Planned.
Contractor: **Engineers Limited Pipeline Co.** and **Alex Robertson Co.**
Completion: January 1, 1958.
Project: 13 miles of 12-in., 2 miles of 10-in., from Santa Cruz to Davenport, Calif.
Status: Planned.
Completion: October 1957.
Project: 1,300 miles of 36-in. from Alberta to San Francisco.
Status: Proposed.

• **Pacific Northwest Pipeline Corp.**
Project: 35 miles of 6, 4-in. lateral from Rainier to Olympia, Wash.
Status: Under way.
Contractor: **Midwestern Construction Co.**
Completion: October 1, 1957.
Project: 36 miles of 6-in. lateral from Coeur d'Alene to Kellogg, Idaho.
Status: Under way.
Contractor: **Hallmac Construction Co.**
Completion: October 1, 1957.
Project: 38 miles of 8-in. from Lind to Moses Lake, Wash.
Status: Under way.
Contractor: **Cape Contsruction Co.**
Completion: September 1, 1957.
Project: 4 miles of 3-in. lateral from Uravan-Nucla lateral to Slick Rock, Colo.
Status: To start September 1, 1957. Pending FPC approval.
Completion: September 15, 1957.

• **Pennsylvania Gas Co.**
Project: 23 miles of 10-in. in Erie County, Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa., 30 miles of branch lines, several small distribution lines.
Status: Has FPC permit.

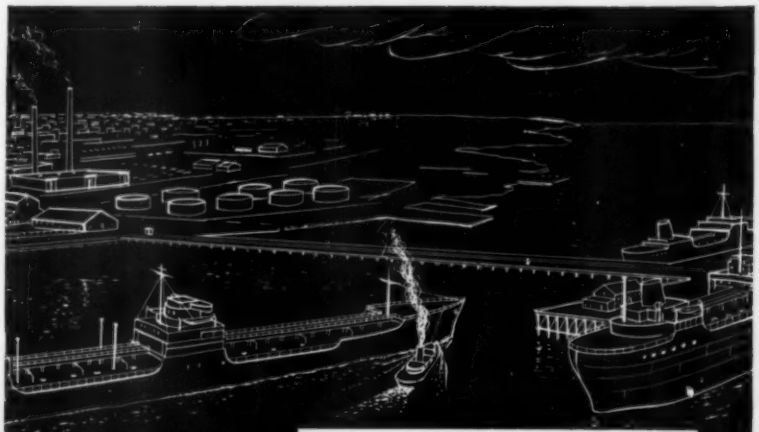
• **Peoples Natural Gas Co.**
Project: 58 miles of 2 to 14-in. extension and replacement lines in Pennsylvania.
Status: Under way.
Completion: September 1957.

• **Permian Basin Pipeline Co.**
Project: 83 miles of 16-in. from its Spraberry station in Midland County, Tex., to tie in with Pioneer Gathering System, Inc. in northwestern Schleicher County, Tex.

Pipeline Patrol

Status: Has temporary FPC approval.

- **Phillips Petroleum Co.**
  Project: 3 miles of 24-in. in Moore County Texas.
  Status: Planned.
  Completion: October 1, 1957.
  Project: 30 miles of 3 to 8-in. in Moore Hutchinson, Sherman, Hansford, and Gray counties, Tex., and in Texas County, Okla.
  Status: Planned.
  Contractor: Various.
  Completion: January 1, 1958.
- **Piedmont Gas Co.**
  Project: 78 miles of 2 to 8-in. extension off Trancontinental in North Carolina to serve Gaston, Lincoln, Catawba, Caldwell and Burke counties.
  Status: Has FPC approval.
- **Pioneer Gathering System, Inc.**
  Project: 70 miles of mostly 16, 12-in. in Val Verde, Schleicher, Sutton counties, Tex.
  Status: Under way.
  Competion: Early fall 1957.
- **Shamrock Pipe Line Corp.**
  Project: 2 miles of 12-in., 9 miles of 10-in., 10 miles of 8-in., 5 miles of 6-in., 3 miles of 4-in. in Dallas and Sherman counties, Tex.
  Status: Planned.
  Completion: Octoboer 1, 1957.
- **Signal Oil & Gas Co.**
  Project: 80 miles of gathering lines to Tioga, N. D., gasoline plant from South Blue Buttes, Antelope, and North Blue Buttes, McKenzie County, N. D.
  Status: Under way.
  Contractor: **C. P. Bartley & Son.**
  Completion: October 1, 1957.
- **Southern California Edison Co.**
  Project: 200-mile line from San Joaquin Valley gas fields to Redondo Beach, Calif.
  Status: Under way.
  Completion: 1957.
- **Southern Natural Gas Co.**
  Project: 10 miles of 8-in. laterals in Napoleonville Field and Fort Jackson Field, La.
  Status: Has FPC approval.
  Completion: December 1, 1957.
  Project: 32 miles of 6-in. from Chandeleur Sound area, Breton Island, La.; 7 miles of 8-in. and 5 miles of 10-in. from Main Pass area to Olga, La.; 9 miles of 8-in. from Bastian Bay Field to Fort Jackson Field; 7 miles of 8-in. laterals in Manila Village Field.
  Status: Has FPC approval.
  Completion: December 1, 1957.
- **Spokane Natural Gas Co.**
  Project: 400 miles of 1 through 24-in. distribution system at Spokane.
  Status: Under way.
  Contractor: **Hallmac Construction Co.**; V. L. Williams, supt., office at Spokane.
  Completion: 1957.
- **Tennessee Gas Transmission Co.**
  Project: 221 miles of 30-in., 101 miles of 26-in., and 10 miles of 24-in. looping from Portland, Tenn., to Greenup, Ky.; from Morehead, Ky., to Catlettsburg, Ky.; from Catlettsburg to Broad Run, W. Va.; from New Wilmington, Pa., to Mercer, Pa.; and from New Castle, Pa., to near Pittsburgh, Pa.
  Status: Pending FPC approval.
  Contractor: **Bechtel Corp.** has completed 24 miles of 30-in. from Olive Hill to Greenup, Ky. **Pipe Line Constructors** has 35 miles of 30-in. in Ky., Gene Gohring, supt., office at Richmond.
  Project: 51 miles of 26-in., 51 miles of 20-in., and 17 miles of 12-in. gathering lines from Kinder, La., to offshore fields in Gulf of Mexico.
  Status: Under way.
  Contractor: **Brown & Root, Inc.**
  Completion: Fall 1957.
  Project: 577 miles of 30-in. from Missis-



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Pipeline Patrol

ippi River delta area south of New Orleans to Portland, Tenn.

Status: Pending FPC approval.

Project: 76 miles of 24-in. between Couders ort, Pa., and Hamburg, N. Y.

Status: Pending FPC approval.

Project: 33 miles of 6, 8, 10-in. laterals in Southwest Pass area below New Orleans.

Contractor: **Houston Contracting Co.**, H. E. Murphy, supt., office at Venice.

- **Texas Gas Transmission Corp.**

Project: 20 miles of 18-in. near Bastrop, La.

Status: Work starts September 1, 1957.

Contractor: **Houston Contracting Co.**, W. H. Hayes, supt.

- **Texas Eastern Transmission Corp.**

Project: 17 miles of 8-in. and 3 miles of -in. from its 20-in. Baytown-Hankamer line to Alco-Mag field in Harris County, Texas.

Status: Has FPC approval.

Project: 97 miles of 30-in. loops between Kosciusko, Miss., and Uniontown, Pa., and 40 miles of 10-in. laterals.

Status: Has FPC approval.

Completion: September 1, 1957.

Project: 667 miles of 30-in. from Kosciusko, Miss., to Uniontown, Pa.

Status: Under way.

Contractor: **H. C. Price Co.** (64 miles from Barton, Ala., to Mount Pleasant, Tenn.; 51 miles from Mount Pleasant to Gladeville, Tenn.; 52 miles from Gladeville to Tompkinsville, Ky.; 68 miles from Tompkinsville to Danville, Ky.; 63 miles from Danville to Owingsville; 46 miles from Owingsville to Wheelersburg, Ohio. Will use four spreads); **Williams Brothers Co.** (63 miles from Egypt, Miss., to Barton, Ala.; 64 miles from Berne, Ohio, to Uniontown, Pa.); **Houston Contracting Co.** (80 miles from Kosciusko to Egypt, Miss., M. L. Thompson, supt., office at Kosciuski and Ackerman. 57 miles from Wheelersburg to Athens, Ohio, W. H. Hayes, supt., office at Oak Hill; 61 miles from Athens to Berne, Ohio, R. E. Thornton, supt., office at Chauncey).

Completion: Fall 1957.

Project: 231 miles of 14-in from Seymour, Ind., to Chicago.

Status: Under way.

Contractor: **H. L. Gentry Construction Co.** has 84 miles from Seymour northeast. **Latex Construction Co.** has next 93 miles. **Western Pipeline, Inc.** has following 39 miles. **Missouri Valley Dredging Co.** has White River crossing. **Pentzien, Inc.** has Wabash and Kankakee crossing.

Completion: September 1957.

- **Texas Illinois Natural Gas Pipeline Co.**

Project: 10 miles of 36-in. to loop exist ng single 30-in. near Joliet, Ill.

Status: Has FPC approval.

Project: 44 miles of 36-in. and 4 miles of 34-in. from south of Joliet, Ill., to Howard Street, west of Chicago.

Status: To start September 20, 1957.

Contractor: **Midwestern Constructors, Inc.**

Completion: Depends on pipe delivery.

- **Transcontinental Gas Pipe Line Corp.**

Project: 172 miles of 36-in., 68 miles of 30-in., 162 miles of 24-in., and 64 miles of smaller size loops from Tex. to N. J.

Status: Work in North Carolina under way.

Contractor: **Western Construction Co.** has 65 miles of 36-in. and 45 miles of 30-in. at scattered spots along system in S. C., N. C., Pa., and Va. Work will start in N. C., office at Winston-Salem.

Completion: December 1957.

Project: 110 miles of 36-in., 16 miles of 30-in., and 13 miles of 24-in. looping in S. Car., Ga., Ala., Miss., and La.

Status: Under way.

Contractor: **Sharman, Allen, Gay & Taylor, Inc.**, E. D. Singleton, superintendent.

Completion: November 1957.

Project: 57 miles of 30, 36-in. loops in La., Miss., Ala., Ga., S. C., and 247 miles of mostly 24 and 16-in. laterals in Tex. and La.

Status: Under way.

Completion: December 1957.

- **Trans-Western Pipe Line Co.** (Warren Petroleum, Monterey Oil Co., J. B. Butler.)

Project: A line from Four Corners area to Calif. border.

Status: Proposed.

- **United Gas Pipe Line Co.**

Project: 40 miles of 8-in. between Pensacola, Fla. and Brewton, Ala.

Status: Under way.

Contractor: **Slade & McElroy, Inc.**

Completion: September 1, 1957.

Project: 9 miles of 4-in. between Jasper and Newton, Tex.

Status: Under way.

Contractor: **H. H. Null, Inc.**

Completion: September 5, 1957.

Project: 9 miles of 8, 10, 12-in. between Grand Cheinier, La., and Forest Oil Co.'s Block 4 in Gulf of Mexico.

Status: Under way.

Contractor: **Sam Carline, Inc.**

Completion: September 15, 1957.

Project: 18 miles of 12-in. from Lirette-Mobile line in Jackson County, south to Bayou Casottee industrial area east of Pascagoula, Miss.

Status: Filed for FPC permit.

- **Western Slope Gas Co.**

Project: 36 miles of 4-in. from Piceance Creek field in northwestern Colo., to Rifle, Colo.

Status: Under way.

Completion: October 1957.

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Pipeline Patrol

Canadian Crude-Oil Pipelines

• **Act Oils, Ltd.**
Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Bella Coola, B. C.
Status: Request has been made for permit from the B. C. government.

• **B-A Alberta Pipe Line, Ltd.**
Project: 35 miles of 8-in. to connect Drumheller field, Alberta, with existing lines running to Edmonton.
Status: Pending approval.

• **Interprovincial Pipe Line Co.**
Project: 156 miles of 20-in. to extend present line from Sarnia to Port Credit, Ont.
Status: Under way.
Contractor: **Robert Somerville Co., Ltd.** and **Sheehan Constructors of Canada, Ltd.** have 90 miles from Sarnia to Bright, Ont., Jim Brown, supt., office at Strathroy.
Completion: September 1, 1957.
Project: 79 miles of 26-in. from Clearbrook, Minn., to Superior, Wis.
Status: Under way.
Contractor: **R. H. Fulton & Co.**
Completion: August 31, 1957.

• **Pembina Pipe Line, Ltd.**
Project: 100 miles of 3 to 12-in. gathering line in Pembina oil field, Alta.
Contractor: **Universal Pipe Line, Ltd.**, subsidiary of Mannix, Ltd., T. Childress, spread superintendent, office at Drayton Valley, Alta.
Completion: November 1, 1957.

• **Royalite Oil Co., Ltd.**
Project: 250-mile line from Athabasca oil sands, northeastern Alta., to Edmonton.
Status: Long range plans.
Completion: 1960.

• **Westspur Pipe Line Co.**
Project: 20 miles of 12-in. from Alida in southeastern Saskatchewan, to the Carnduff-Glen Ewen area to tap Cantal, Hastings, Florence, Carnduff, and Glen-Ewen fields; 14 miles of 4, 6, 8-in. gathering lines.
Completion: River crossing completed. Total project to be completed in 1960.
Status: Has requested permit from Board of Transport Commissioners.
Contractor: **Majestic Contractors, Ltd.**, Jeff Minter, supt., office at Estevan, Sask.
Completion: No date set.

Canadian Products Pipelines

• **Hydrocarbons Pipeline Co.**
Project: 800 miles of 6 and 8-in. L.P.G. line from near Edmonton, Alta., to Fort William, Ont.
Status: Has permit from Parliament of Canada. If approved by Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board, work will start in 1957.
Construction consultants: **Dutton-Williams Brothers, Ltd.**, and **A. D. Little Co.**

Canadian Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co., Ltd.**
Project: 637 miles of 34 to 16-in. gathering lines in Alberta.
Status: Under way.
Contractor: **Dutton-Williams Brothers, Ltd.** has preliminary studies, design and management-engineering. **Universal Pipe Line, Ltd.** subsidiary of Mannix, Ltd., jointly with **Marine Pipeline & Dredging Co.**, has crossing of Red Deer River near Cavendish, Alta., J. Hysuick, spread superintendent, office at Empress. **Fulton Banister, Ltd.**, has 17 miles of 34-in. west from Burstall, Sask., to near Cavendish, Alta., and 100 miles of 18-in. north to Bindloss and Provost fields, George Caron, supt., office at Empress, Alta., to complete summer 1957.

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Pipeline Patrol

• **Inland Natural Gas Co., Ltd.**
Project: 304 miles of mainline and 2[illegible] miles of laterals from Savona to Nelson B. C.: 150 miles of 12-in.; 112 miles of 10-in. 67 miles of 6-in. Also will build 400 miles of distribution piping in 31 towns.
Status: Under way.
Contractor: **Dutton-Williams Brothers Ltd.** Pat Campbell, manager, office at Perticton.
Completion: October 1, 1957.

• **North Canadian Oils, Ltd.**
Project: 47-mile extension into Jasper, Alta., of its 10-in. line from Wabamun to Hinton west of Edmonton.

• **Northern Ontario Pipe Line Crown Corp.**
Project: 675 miles of 30-in. from the Ontario-Manitoba border to near Kapuskasing, Ont. (part of the 2,250-mile Trans-Canada line; will be leased to Trans-Canada Pipe Line Co. with option to buy.)
Status: 79-mile section from Stedman to Forham Township under way.
Contractor: **Dutton Williams Brothers** has 58 miles from the Manitoba-Ontario border west of Kenora to a point east of the crossing of Ontario Highway 17. **Morrison Shivers, Ltd.** has 94 miles from the east crossing of Highway 17 to a line separating the townships of Hyndman and Hodgson. **Majestic Contractors & Associates** has 80 miles from the Morrison Shivers terminal to Stedman Township. **Houston Contracting Co.** has 79 miles from Stedman to Forham Township. R. L. Silar, spread superintendent, office at Raith, Ont.
Contractor: **River Construction Corp.,** has Winnipeg River crossing near Kenora, Ont. to complete November 15, 1957.
Completion: End 1957.

• **Plains-Western Gas & Electric.**
Project: 25 miles of 10-in. from the Trans-Canada Pipe Line to Brandon, Manitoba.
Status: Under way.
Contractor: **Banister Construction, Ltd** Ole Johnson, superintendent.
Completion: September 1, 1957.

• **Provo Gas Producers, Ltd.**
Project: 22 miles of 3 to 12-in. gathering lines and wellhead tie-ins in Provost Field, Alta.
Status: Under way.
Contractor: **Fulton Banister, Ltd.,** Jim Boyce, supt., office at Consort.

• **Saskatchewan Power Corp.**
Project: 300 miles of 1 to 20-in. distribution lines at Regina, Sask.
Status: Planned.
Contractor: **S. E. Construction (Alberta), Ltd.,** and **Pacific Pipeline Construction (Alberta), Ltd.,** jointly have 166 miles.
Completion: September 1, 1957.

• **Trans-Canada Pipe Lines, Ltd.**
Project: 574 miles of 34-in. from the Alberta-Saskatchewan border to Winnipeg, 310 miles of 20-in. from Toronto to Montreal, 33 miles of 24-in. from Toronto to Niagara, N. Y. (First part of 2,250-mile line from Alberta to Toronto and Montreal. One 675-mile section is being built by Northern Ontario Pipeline Crown Corp.)
Status: Under way.
Contractor: **Majestic Contractors, Ltd.** (104 miles from Burstall to Stewart Valley, Sask., R. L. Leonard, supt., office at Cabri); **Canadian Bechtel, Ltd.** (110 miles from Swift Current to Moose Jaw, Sask., completed, and 87 miles from Portage la Prairie to Winnipeg, Man., to complete August 20, 1957, J. L. (Joe) Work, supt., offices at Portage la Prairie and Winnipeg); **Universal Pipe Line, Ltd.,** subsidiary of Mannix, Ltd. (90 miles from Moose Jaw to Welseley, Sask., supt., Otis Hare, office at Regina, Sask.); **Dutton-Williams Brothers, Ltd.** (97 miles from Deveren to Moosomin, Sask., to complete

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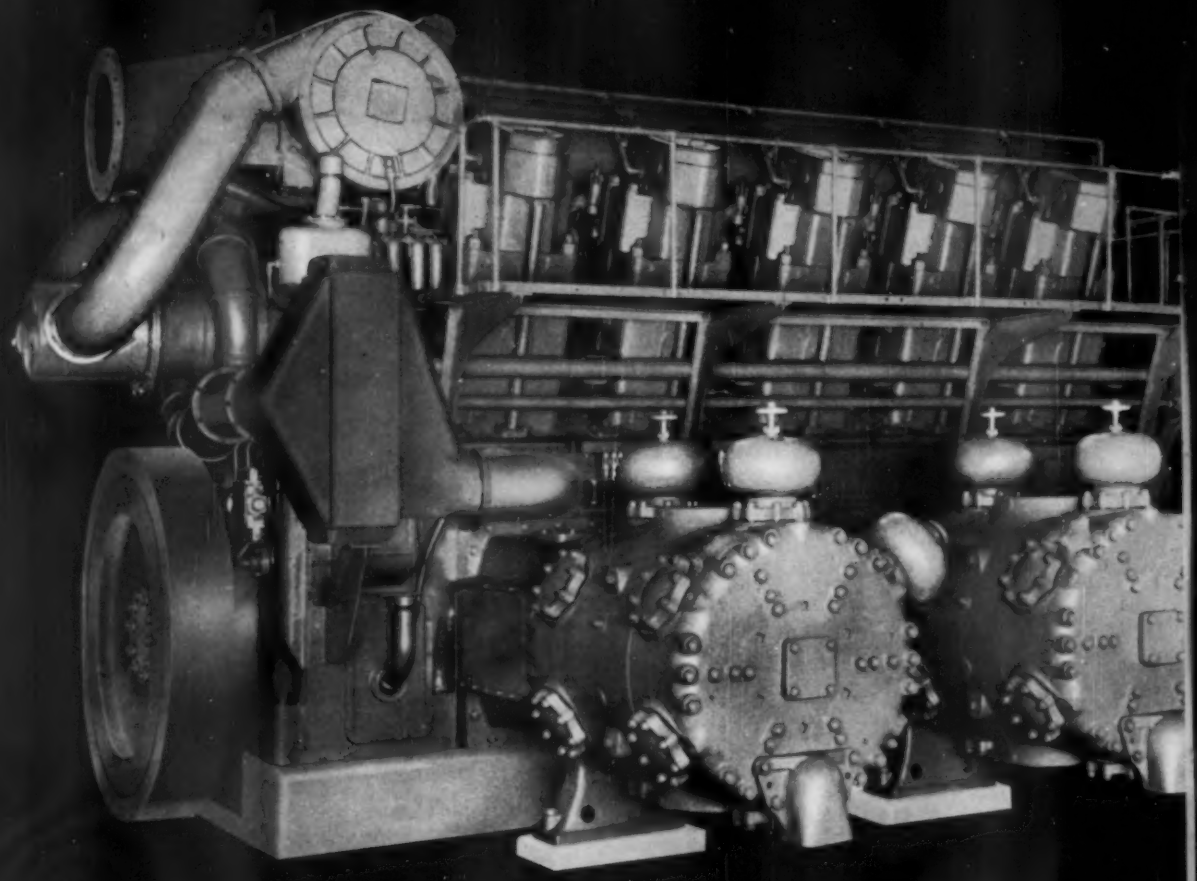
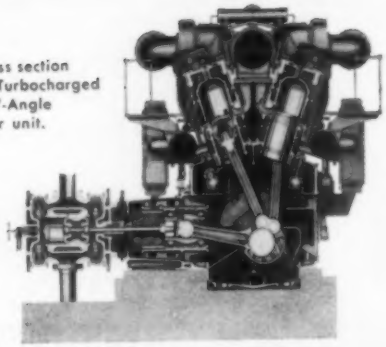
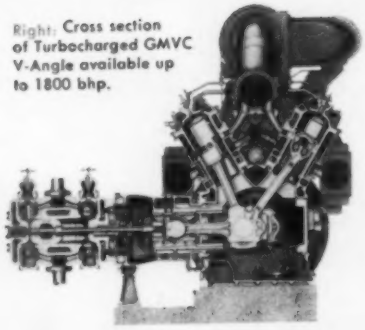


Right. Cross section of Series Turbocharged GMWC V-Angle compressor unit.



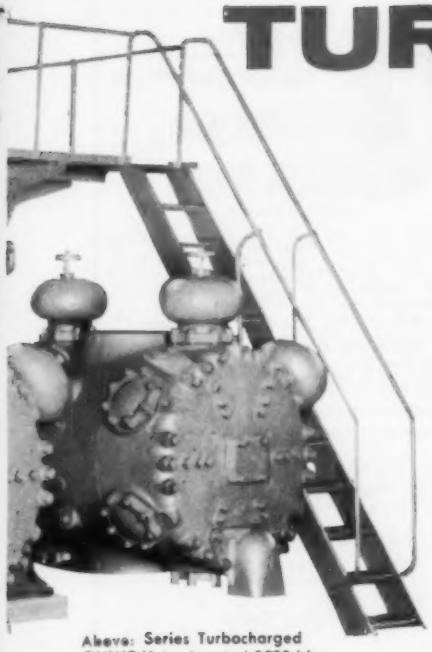
Right. Cross section of Turbocharged GMVC V-Angle available up to 1800 bhp.



with Cooper·Bessemer

SERIES TURBOCHARGED

V-Angle Compressors



Above: Series Turbocharged GMWC V-Angle rated 3500 bhp at 250 rpm. The largest and most efficient available today.

Remarkable gains in power output, fuel economy and power-to-space ratio, as important as they are, fail to reveal a key feature of Series Turbocharging. What about performance at start-up and at reduced speeds and loads? Here is one of the underlying factors in Cooper-Bessemer's development of this unique turbocharging system.

With both exhaust-driven and engine-driven turbo compressors operating in series, efficient supercharging is by no means limited to optimum full-load conditions. In fact, *at no time* is supercharging effect completely dependent on exhaust pressure or exhaust heat.

For further details on these and other unusual advantages featured by Series Turbocharged V-Angle Compressors, ask for Bulletin ST-82 . . . or contact the nearest Cooper-Bessemer office.

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VALLEY ELECTRIC CORP.
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Pipeline Patrol

August 1957, plus 120 miles of 20-in. between Toronto and Montreal); **Price-Poole of Canada, Ltd.** (100 miles from near McGregor to Miniota, Man.); **Oklahoma Pipe Line Constructors** (83 miles of 20, 24-in. between Toronto and Montreal, and between Toronto and Niagara, N. Y.); **Grayco Constructors, Inc.** (120 miles of 20-in. between Toronto and Montreal).

Completion: September 1957.

Project: 82 miles of 30-in. from near Winnipeg to the Ontario-Manitoba border.

Status: Under way.

Contractor: **Majestic Contractors, Ltd.**, K. B. Killingsworth, spread superintendent, office at Ste. Anne, Man.

Completion: October 15, 1957.

• **Union Gas Co. of Canada, Ltd.**

Project: 142 miles of 26-in. from Dawn Township to Hamilton, Ontario, plus 55 miles of 6 to 20-in. laterals, and 317 miles of 2 to 12-in. distribution lines.

Status: Planned.

Contractor: **Canadian Bechtel, Ltd.** has the 26-in. line, to complete November 15, 1957, office at Galt, Ont.

Completion: November 30, 1957.

• **Westcoast Transmission Co., Ltd.**

Project: 156 miles between Peace River, Alta. and B. C., and Vancouver: 83 miles of 26-in., 16 miles of 20-in., 8 miles of 18-in., 22 miles of 12-in., 2 miles of 10-in., 12 miles of 8-in., 13 miles of 4-in.

Status: Under way.

Contractor **Morrison & Knudson, Inc.**

Completion: September 1, 1957.

Project: 42 miles of 20-in. and 100 miles of 30 in. from Savanna Creek area, Alta., to Canadian-Idaho border.

Status: Planned.

Completion: November 1, 1958.

Foreign Crude-Oil Pipelines

• **Bolivian Gulf Oil Corp.**

Project: **160 miles of 10-in. and 43 miles of 8-in. from Sicascia to Arica on the Chilean coast.**

Status: To start late 1957.

Contractor: **Williams Brothers Co.**

Completion: 1958.

• **Bolivia-Paraguay**

Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.

Status: Planned.

Contractor: Five Lilles, a French Combine.

• **Burmah Oil Co., Ltd.**

Project: 850 miles of 20-in. from Nahorkatiya to Calcutta, India.

Status: Proposed.

• **Caltex**

Project: 30 miles of 30-in. from Duri field in Sumatra to Dumai where a deepwater terminal will be built. Line will be extended 35 miles to Minas field later.

Status: Planned.

Completion: Duri-Dumai line to be finished in 1959; extension to Minas later.

• **Colombian Petroleum Co.**

Project: 42 miles of 6-in. from Tibu field to Rio de Oro in Colombia.

Status: Under way.

• **C.R.E.P.S., Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN Repal), and Cie. Francaise des Petroles Algerie**

Project: Two 10-in. lines from Hassi Messaoud and Edjele, Algeria to the railhead at Touggourt.

Status: Planned.

Completion: 1958.

Project: 450 miles of 16-in. from Edjele field in southeastern Algeria to a Mediterranean port on the Libyan coast.

Status: Pipe has been ordered.

Grip-Tite

POSITIVE EXPANDING EARTH ANCHORS
"Dead Men That Hold"

Built especially for heavy oil field use. Portable drilling mast, well servicing mast, pulling truck, floor blocks, derrick guy wires. Tests from 8,000 to 50,000 lbs.

All Grip-Tite anchor rods have 3" I.D. eye.

Cleans both line and bob. Eliminates many gauging hazards. Wiper is below hatch. Oil dripping from line falls back into tank. Saves cleaning and painting jobs. Does not interfere with thiefing. Rigid construction. Replaceable insert made of oil resistant Hycar rubber.

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Thoroughly Specialized
RIGHT-OF-WAY ACQUISITION
From Title Search . . . To Damage Claims

Pipeline Patrol

- **Creole Petroleum Corp.**
  Project: 87 miles of 30-in. from Temblador field to Caripito in Venezuela.
  Status: To start work early 1958.
  Contractor: **Pipe Line Engineering Co.** and **Oklahoma Pipe Line Constructors.**
  Completion: April 1958.
  Project: 9 miles of 26-in. from Ule to La Salina in Venezuela.
  Status: Planned.
  Completion: Late 1957.
- **Deutsche-Shell A.G.**
  Project: 120 miles of 20, 24-in. from Marseilles, France, to Rotterdam, Germany, to tap the 700 mile trans-Europe line proposed by the Royal Dutch-Shell Group.
  Status: Planned.
  Completion: 1960.
- **Iraq Petroleum Co.**
  Project: About 600 miles of up to 40-in from Kirkuk field through Iraq to Turkish port of Iskenderun on the Mediterranean.
  Status: Proposed. Survey completed.
- **Mene Grande Oil Co.**
  Project: 97 miles of 30-in. from fields in Eastern Venezuela to Puerto La Cruz.
  Status: Under way.
  Contractor: **Fulghum Contracting Corp.** has 22 miles between Oficina and Anaco.
  Completion: First quarter 1958.
  Project: 45 miles of 24-in. from Oficina to Melones, Venezuela.
  Status: Planned.
  Completion: First quarter 1958.
- **Middle East Pipeline**
  Project: 1,500 miles of 38 and 40-in. line from Persian Gulf to Mediterranean at Iskenderun, Turkey.
  Status: Proposed.
- **National Iranian Oil Co.**
  Project: A 1,000-mile line to move Qum crude to the Mediterranean.
  Status: Under study.
- **North-West Oil Pipelines Co.** (newly formed by six West German refiners, headed by affiliates of Standard Oil Co. (N.J.), and British Petroleum Co., Ltd.)
  Project: 210-mile line from the refining centers in the industrial Ruhr area of West Germany to Wilhelmshaven.
  Status: Planned.
  Completion: 1959.
- **Royal Dutch-Shell**
  Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through Eastern France, Luxembourg West Germany, and Netherlands, and Belgium. Main trunk to be 30-in.
  Status: Company is considering project together with several other companies.
- **Standard-Vacuum Petroleum Maatschappij.**
  Project: 94 miles of 8-in. from Lirik field, Central Sumatra, to deep-water terminal on Siak River, near Buatan. A 3-in. hot-water "defroster" line will be laid under the 8-in. to heat the heavy crude.
  Status: Under way.
  Completion: Late 1957.
- **Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie**
  Project: Line in Sahara Desert area to move oil from Hassi Massaoud field. Two routes possible: 200 miles from the field northwest to Laghouat; 260 miles from the field to the north and slightly east to Biskra
  Status: Under study.
- **Union of Soviet Socialist Republic**
  Project: 2,300-mile Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
- **Yacimientos Petroliferos Fiscales** (Argentina)
  Project: 932 miles of 12-in. from Campo Duran to San Lorenzo.
  Status: Planned.

(Continued on page 328)

W&T V-notch Chlorinator installed at Esso's Baton Rouge Refinery feeds chlorine at rates up to 500 lbs./24 hr. Units are available with chlorine capacities up to 2000 lbs./24 hr.

NEW W&T V-NOTCH CHLORINATORS,

used at Oil Refineries, are rugged, easy to operate and moderately priced.

Esso Standard Oil Co. has a **W&T** V-notch Chlorinator installed at their Baton Rouge, La., Refinery. The chlorinator, installed in a small shed open to the sun and weather, chlorinates cooling water for slime control.

This type of installation would be considered rugged service for other equipment but V-notch Chlorinators are designed for such use. They are made of materials that are completely resistant to corrosion as well as weather. They are simple to operate and to maintain. In addition, **W&T** V-notch Chlorinators are an attractive piece of equipment, colored green to fit into industrial color schemes.

For more information about **W&T** V-notch Chlorinators, send for bulletin CD-44.

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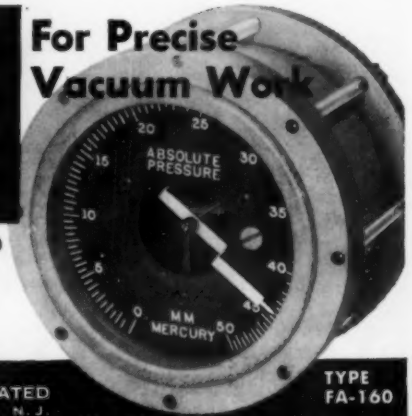

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Write for Publication No. TP-28-A

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Among the Drilling Contractors

Huntsville Company Gets Five-Well Texas Contract

Driscoll & Scott Drilling Corp., Huntsville, Tex., has contracted with Whiffen Estate, Inc., of Dallas, for five additional wells to be drilled before the end of the year.

All the wells will be in Texas. Three will be Edwards lime wells in Guadalupe County, near Luling. Another will be a 6,500-ft. test near Ben Bolt, in Jim Wells County. The other will be a 7,000-ft. test on the Horseley prospect, in Van Zant County.

Starting of this contract follows the recent completion by this contractor of the third producing well for the same operator on its Brown "A" lease in Caldwell County.

Halbert Drilling Co., Tyler, Tex., will drill Loyce Phillips' second well in the new Nan-Su-Gail field, in eastern Freestone County, East Texas. Its location, at 1 Nan-Su-Gail Gas Unit 2, is about 2,300 ft. east of Phillips' discovery well, 1 Rankin, completed last June. The latter was productive of gas and condensate from sub-Clarksville sand at 4,386½-99½ ft. A 4,600-ft. permit was taken out for the new test.

Louisiana Delta Offshore Co., New Orleans, has contracted for an ultra deep test to be drilled for Barnwell Drilling Co., of Shreveport, at a wildcat location 4 miles northeast of Kenilworth field, St. Bernard Parish, southeastern Louisiana. Location, at 1 Shell Beach, in 25-13s-14e, is about 15 miles southeast of New Orleans. It is near the shore of Lake Borgne. A 15,000-ft. test is planned.

Dan Clark Drilling Co., Corpus Christi, Tex., is drilling a 7,500-ft. test for F. P. Zoch, Jr. and associates at a wildcat location 1½ miles southwest of Edroy, in San Patricio County, South Texas. Location is in the Sacarias Villarel Survey.

Dorris Ballew, Natchez, Miss., has taken on a deep-drilling job in northeastern Mississippi's portion of the Black Warrior basin. It will be a 10,000-ft. Ordovician test for Phillips Petroleum Co. and Honolulu Oil Corp. in southwestern Chickasaw County. Location, at 1-C Crawford, in 33-14s-2e, is about 17 miles west of Trebloc gas field, nearest production of any kind. Trebloc, discovered by Carter Oil Co. in 1953, has two shut-in gas wells, productive from the Mississippian Carter sand.

A. W. Williams Drilling Co., Mobile, Ala., has taken a 3,600-ft. wildcat job in Rankin County, Mississippi. Location is off the east side of the old Jackson gas area, east of Jackson. Drilling is for E. G. Jeffries, at 1 G. M. & O., in 8-5n-2e.

New Duncan Drilling Firm Runs Two Rigs at Aneth

Basin Drilling Corp. is a newly formed contracting organization headquartering at Duncan, Okla. It is headed by J. E. Jackson and John E. Jackson, Jr. It is starting with two heavy-duty rotary rigs, which are operating in the Aneth area, southeastern Utah. A district office is at Farmington, N. M., where Bart Jenkins is representative.

Comet Drilling Co., Lafayette, La., has a new wildcat operation in northeastern Calcasieu Parish, Southwestern Louisiana. It is a contract job for H. S. Cole, Jr., of Houston, at 1 Powell, in 22-8s-7w. Location is about 3½ miles northwest of Iowa field, and about 15 miles northeast of Lake Charles. Plans call for a 10,200-ft. test.

Southland Drilling Co., San Antonio, is to drill a Frio well for Northern Pump Co. in the Ricardo area, 8 miles southeast of Kingsville, in Kleberg County, lower Texas Gulf Coast. Location is 3 miles northeast of Ricardo townsite in Section 41, of the Kleberg Town & Improvement Co. Subdivision. Expected producing zone is about 8,600 ft.

Delta Drilling Co., Tyler, Tex., is getting under way on a 9,600-ft. Cotton Valley test it has contracted to drill for Monsanto Chemical Co. at a wildcat location 1½ miles northwest of Ruston, in Lincoln County, North Louisiana. Location is on Monsanto's Hilton lease, in 15-18n-3w.

Butler-Johnson, Inc., Shreveport, is the contracting firm on a 7,000-ft. wildcat General Crude Oil Co. is starting 3½ miles northeast of Como, in eastern Franklin County, northeastern Lou-

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'Bestolife Lead Seal Tool Joint and Casing Compound gives maximum joint make-up, for tight seals—and easy separation of parts, for faster handling without danger to joints. Standard of the oil country for over twenty-five years. Unconditionally guaranteed. Packed in 1¼, 5, 20 and 50 lb. containers. Sold by leading supply houses the world over.

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isiana. Location is on the Egypt Plantation, in 32-14n-9e. Nearest production is 3½ miles east in Killens Ferry field. It is about 8 miles east of Winnsboro.

A **Richardson & Bass** rig will drill Superior Oil Co.'s new deep test in the Palmetto Bayou area in southwestern Terrebonne Parish, coastal Louisiana. Superior has taken out a permit for a 14,500-ft. test with location listed as 4-B Louisiana Terre, in 6-19s-13e. Location is on the east side of the field, discovered late in 1955 by Humble Oil & Refining Co.

Offshore Co., Baton Rouge, La., has the contract on the deep wildcat California Co. has scheduled for South Pass area, in the Gulf of Mexico, off Southwest Pass of the Mississippi River delta, Plaquemines Parish, Louisiana. Location is in Block 40, about 2½ miles from nearest production. Contract is for 9,500 ft.

Eagle Drilling & Development Co., Natchez, Miss., is on a new contract job a mile north of Pine Ridge field, in northern Adams County, southwestern Mississippi. It is a 6,000-ft. Wilcox test for Norman Germany and G. W. Gulmon at 1 Lambdin, in 33-8n-2w. Location also is about 2 miles southwest of Church Hill field.

Woolf & Magee, Tyler, Tex., have a rig under contract to Serio-Punches Oil Co., of Natchez, Miss., for a 6,800-ft. well 2½ miles northwest of Ireland field, in northern Wilkinson County, southwestern Mississippi. Location is for 1-B Anderson, in 45-5n-1w, near the Adams county line. It is about 2 miles southwest of Deerfield field, in the latter county.

Halbert Drilling Co., Tyler, Tex., is making hole on a new contract operation in northern Kaufman County, East Texas. Drilling is for La Gorce Oil Co., of Fort Worth. It is a Paluxy test to a depth of about 5,500 ft. Location, at 1 Tankkersley, in the Juan Gonzales Survey, is about 6 miles southeast of Terrell.

Salt Dome Production Co., Houston, will drill Gulf Oil Corp.'s new offshore wildcat in Block 148, East Cameron area, off Cameron Parish, Louisiana. Location is about 2 miles northeast of California Co.'s Block 160 field, nearly 50 miles from shore. Gulf is planning a test to 12,000 ft. The operation will be its 1-A OCS-0538. Block 160 field was opened last September and has two gas wells, one in a 9,700-ft. sand, and the other an 8,700-ft. zone.

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Excessive sand and sediment holds back your oil. For fast, easy clean out with fewer round trips and less downtime, use world famous Miller Sand Pumps.

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Lengths—20, 25, 30 ft.

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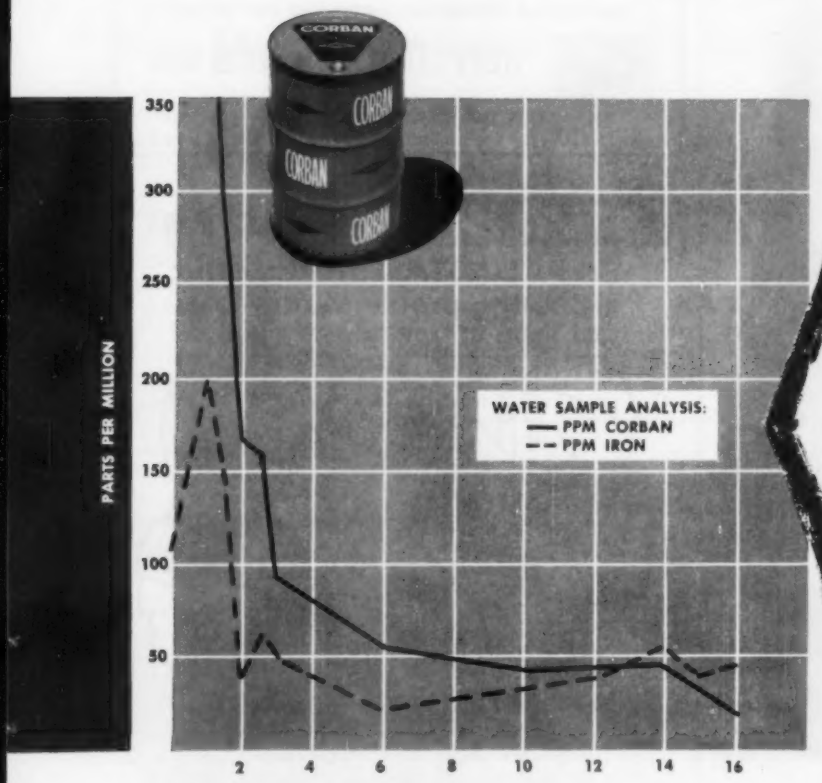
Corban® has been recognized for some time as one of the most effective, economical corrosion inhibitors for protecting the internal surfaces of well equipment from corrosion.
Now, research and field testing bring you a new technique for longer-lasting protection. This technique of *squeezing* with Corban involves pumping Corban into the producing formation. It is then slowly produced back with normal production over several months, plating out in a protective film over metal well equipment.
To date this new approach to the use of Corban for corrosion control has been even more successful than anticipated.



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Production from this particular gas condensate well is about 10 MMCF per day, with about 150 bbls. of distillate and about one barrel of water. The squeeze treatment with Corban was performed by pumping 50 gallons of Corban 101, mixed with 30 gallons of fresh water, into the formation. This mixture was displaced with condensate and then over-flushed with 12 bbls. of condensate.

All of the pumping was done at a rate of about one barrel per minute. The maximum surface pressure was 5000 psi as the Corban was entering the formation. The pressure while the condensate was pumped into the formation was 4000 psi. No adverse effects on production were noted following the treatment. Corrosion protection was provided for 16 weeks—without having to open up the well for subsequent inhibitor treatments during this period.

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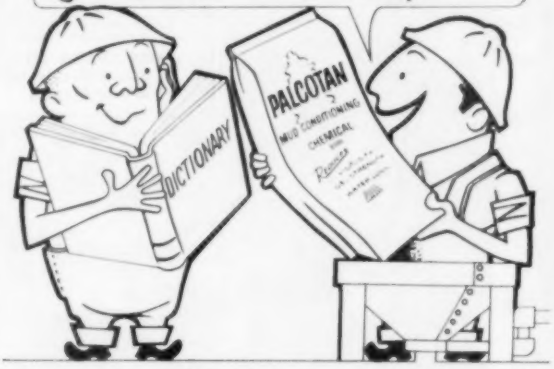
MUD MIKE says:

So PALCOTAN licked your viscosity problem—now you got time to see how to spell it!



However you spell it, viscosity is controlled, along with gel strength and water loss. *Palcotan* exceeds specifications for quebracho in many applications — costs less than other additives — can be added with or without caustic. It's a readily soluble coarse powder in convenient multiwall bags.

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SHOWCASE...

NEW EQUIPMENT

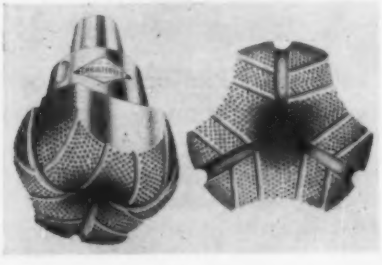
New Device Prevents Trailer Jackknifing

Jackknifing of a tractor-trailer may be prevented with this new device. The maker claims the device prevents a trailer from jackknifing into the cab of the tractor and also keeps the trailer from breaking away from the tractor.

The device consists of two main parts connecting the tractor and trailer. On the tractor, a cylinder mounts on a pivot. a high-strength chain connects the cylinder to the trailer.

The device is designed to prevent any legal load from jackknifing on the highway. It can be mounted simply on any type of tractor-trailer, either by welding or by bolting. It is completely interchangeable. **Write or Call: K-W Mfg. Co., Schenectady, N. Y., for details on antijackknifing device.**

●



Cloverleaf Bit Helps Eliminate Sticking

This new Christensen cloverleaf-design drilling bit, incorporating oversize cutaway sections is suited for combating the problem of sticking frequently encountered in deep or sloughing holes, according to company officials.

The large cutouts permit the circulation of junk or loose formation off the bottom of the hole, minimizing the possibility of damage when starting the bit or making a connection. This design also prevents swabbing of the hole or any hydraulic action when tripping, the company reports.

The bit design can be altered to meet the requirements of the rock to be drilled. Most any combination of waterways and/or diamond pattern can be used, in either a three or four-pad design. **Write or call: Christensen Diamond Products Co., 1937 South Second West Street, Salt Lake City 10, Utah, for details on cloverleaf bit design.**

●

Vapor-Phase Chromatograph Suited for Lab or Field

Simple and rapid analysis of a number of vaporizable mixtures can be done with this new vapor-phase chromatograph, the maker reports. Called the Chromagraphette Series 9490, it is a desk model designed for use either in

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER .....

.....

.....

Described in OIL AND GAS JOURNAL - Issue of August 19, 1957

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

DATE .....

New Equipment

the laboratory or field. The power required is 150 watts at 115 volts and 60 cycles, permitting the instrument's use in panel trucks for field analysis.

The apparatus is capable of analyzing gaseous and liquid mixtures for components boiling up to 126° C. The maximum operating temperature is 100° C.

It is applicable to the analysis of hydrocarbons from methane through nonane and other components having a similar boiling-point range, the company reports. Its special features are: (1) an optional 10-mv. recording potentiometer, (2) interchangeable sampling system incorporated for either liquids or gases, (3) a sensitive thermistor type of thermal-conductivity cell, and (4) ability to accommodate columns up to about 30 ft. long. **Write or call: Podbielniak, Inc., 341 East Ohio Street, Chicago 11, Ill., for details on Series 9490 chromatograph.**

Automatic Pipe Tongs Speed Handling

Safe, fast, and easy pipe handling can be done with these new Mathey pipe tongs, according to the maker. They release the pipe automatically when the weight is slacked off, eliminating the need for manual release.

Ruggedly constructed, the tongs come in standard pipe sizes of 4 to 36 in. **Write or call: C. A. Mathey Machine Works, Inc., 212 So. Frankfort, Tulsa, Okla., for details on automatic pipe tongs.**

ANOTHER NEW
Major Oil Company
Loading Rack in Action . . .

operating with OILCO
LONG-RANGE LOADER
No. 462

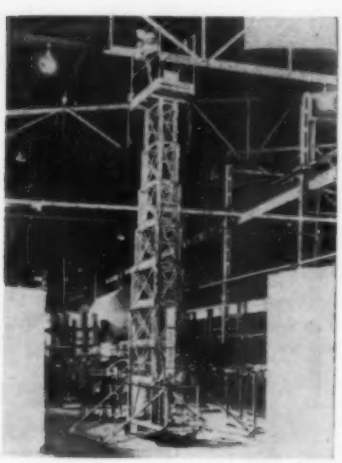
To meet the requirements of the industry—distributors, bulk plants and marketers—Oilco has perfected this assembly of extreme long range—a new loader which, without re-spotting, loads transports and tank cars in a jiffy. No intricate mechanism. It does its work quickly, easily and efficiently.

This Spring-Matic assembly includes No. 150 self-closing, shock-proof loading line valve, and two Model 857 swing joints equipped with TIMKEN tapered roller bearings to insure positive alignment and greater friction-free load capacities.

The above illustration shows a new, modern installation employing 24 of these new Spring-Matic loaders on two racks, performing the job for which it was intended and doing it well.

Write for Folder A-7 for complete description

OIL EQUIPMENT MANUFACTURING CO.
INCORPORATED
3100 VERMONT AVE., LOUISVILLE 11, KY.



Telescopic Platform Lift Locks In Any Position, 9 to 35 Ft.

This new Sky-Ride mobile hydraulic platform lift can be stopped and safely locked in any position from 9 to 35 ft., the maker reports. Its safety features include: (1) a control valve at the hydraulic fluid-return outlet preset at the factory to control the descent of the platform in case of unexpected leakage, (2) a built-in leveling plumb for leveling the platform with the outriggers, and (3) riveted and welded construction.

Other features include 10-ft. 9-in. outriggers, a steel-tubing rail and mid rail, and a safety toeboard on the 2-ft. 4-in. by 4-ft. platform. Four bronze-bearing roller chains support each section. **Write or call: Grand Specialties Co., 3101 West Grand Avenue, Chicago 22, Ill., for details on Sky-Ride.**

●

Strip-Chart Recorder Responds Fast

A high degree of reliability and fast response are achieved by this new Mount Sopris Model 200 transistorized dual-pen strip-chart recorder of the servo driven, self-balancing potentiometer type, the company claims.

Increased reliability is said to be achieved by the use of transistors and semiconductor diodes. The chopper and all transformers are hermetically sealed. And the servo gearing and slide-wire are totally closed assemblies.

The recorder is built around an anodized cast-aluminum framework. It is capable of withstanding severe vibration and mechanical shock without damage, the maker says.

The two pens share the width of the 5-in. chart. They are mounted in line to provide correlation of the measurements being recorded. The span of either pen may be adjusted to occupy from 25 to 75 per cent of the chart width with the second pen occupying the remainder.

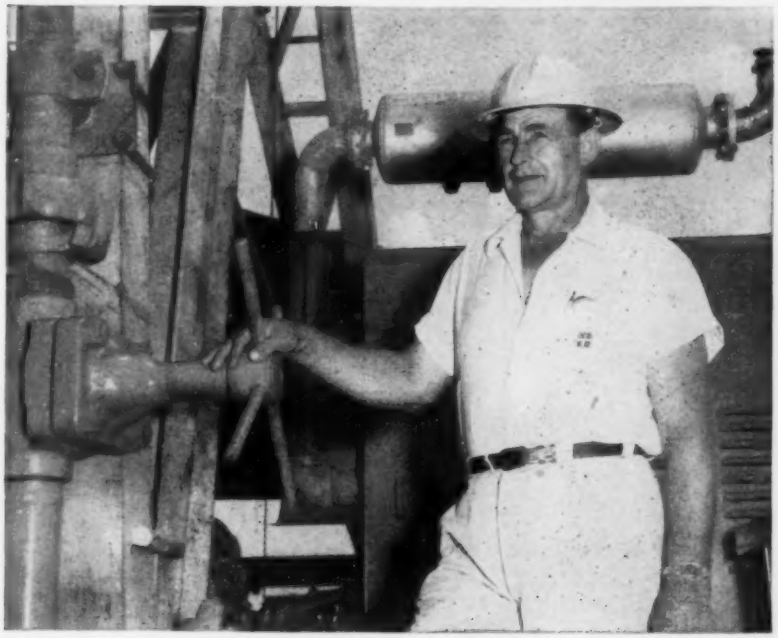
Measuring 10 by 10 by 15 in., the recorder weighs 23 lb. The chart drive may be from an external shaft or a selsyn or synchronous motor. **Write or call: Mount Sopris Instrument Corp., 1320 Pearl Street, Boulder, Colo., for details on Model 200 receiver.**

●

Resin Coating Available in Colors

Plasticool paint, reportedly an effective sunlight heat-reflective coating for all storage tanks, vehicles, trucks, tank cars, and buildings, is now available in colors, the maker reports. Available

Tips on Mud Valves for Toolpushers . . .



"Woodie" Farris, veteran toolpusher, finds MUDWONDER Valves superior to others he has used

Non-clogging MUDWONDER Valves are real oil field favorites!

by Woodrow Farris, Toolpusher, Rig #3
Kilroy Drilling Company, Alvin, Texas

NEARLY five years ago, I was pushing tools on a Gulf Coast rig. Some of the first test models of the MUDWONDER were installed on it. At first they seemed like just another mud valve . . . but then I noticed the MUDWONDERs simply didn't "sand up" like other types. Began to keep an eye on those Rockwell-built MUDWONDERs . . . and, by golly, they really stood out!

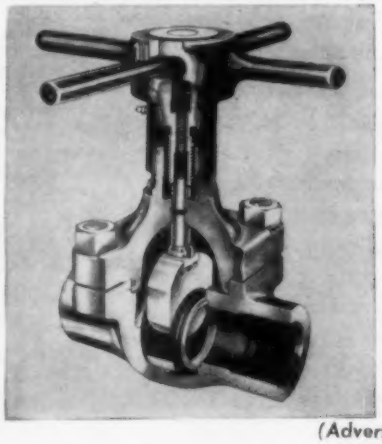
After the second or third hole, we knew we *had* something. The new MUDWONDERs just didn't clog. Even under worst conditions there was never more than a teaspoon of sand in the bonnet—and even this usually flushed free in the flow of mud.

There was no shut-down for cleaning. When essential, repairs could be made without down-time. The one-piece MUDWONDER body stayed right in the line. Rig personnel really *liked* the MUDWONDERs . . . said they were the cleanest and easiest to operate of any mud valves we'd ever used. Yet they cost us no more than ordinary mud valves.

Now, when Kilroy Drilling Company bought our present Rig #3, it was second-hand but almost new. There were a few MUDWONDERs already on it. But on the strength of our experience, Mr. John Baker, Drilling Superintendent, and I both were convinced we wanted MUDWONDERs all the way around. So we re-rigged the whole mudline system that way. Good thing, too. In a year of continuous operation, we've spent virtually nothing on repairs and have had a minimum of maintenance.

MUDWONDER Valves are built in 2", 3" and 4" sizes with screwed or flanged ends for 2000 psi WP (4000 psi test) and 3000 psi WP (6000 psi test). See your favorite oil field supply store, or write Edward Valves, Inc., Subsidiary of Rockwell Manufacturing Company, East Chicago, Indiana.

MUDWONDER cutaway view shows the double thread construction, separated stainless stem and hard chromed gate with "T" slot connection, and the one-piece seat insert with the buna-N molded integrally over the steel wear-rings.



(Advertisement)

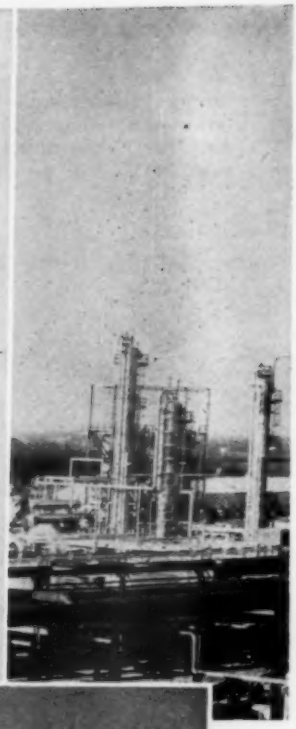
GIANT TIDEWATER REFINERY HAS ALL THREE

PROTECTION

CONTROL

MEASUREMENT

with reliable products of Manning, Maxwell & Moore



The Tidewater Oil Company's mammoth new Delaware Refinery is rightly referred to as the "refinery of the future." C. F. Braun & Co., engineering contractors, built the plant on the 5,000 acre site. Most of the processing units are unequalled anywhere for size and capacity. Tidewater incorporated the most advanced design and equipment to assure the greatest flexibility, economy and safety.

To provide around-the-clock protection, control and measurement, this ultra-modern refinery makes full use of dependable Consolidated Safety Relief Valves, Hancock Valves and Ashcroft Pressure Gauges. These products of Manning, Maxwell & Moore are precision engineered and built to insure the perfect performance, freedom from costly maintenance and long-life service so vital to economical refinery operations.

Whether you are modernizing or enlarging your plant for increased capacity . . . whether you are scheduling a "turn-around," planning a new processing unit or adding storage facilities – call on Manning, Maxwell & Moore regarding problems in protection, control and measurement. District offices and industrial distributors in the United States and Canada as well as agents and manufacturing licensees throughout the world are ready to serve you.

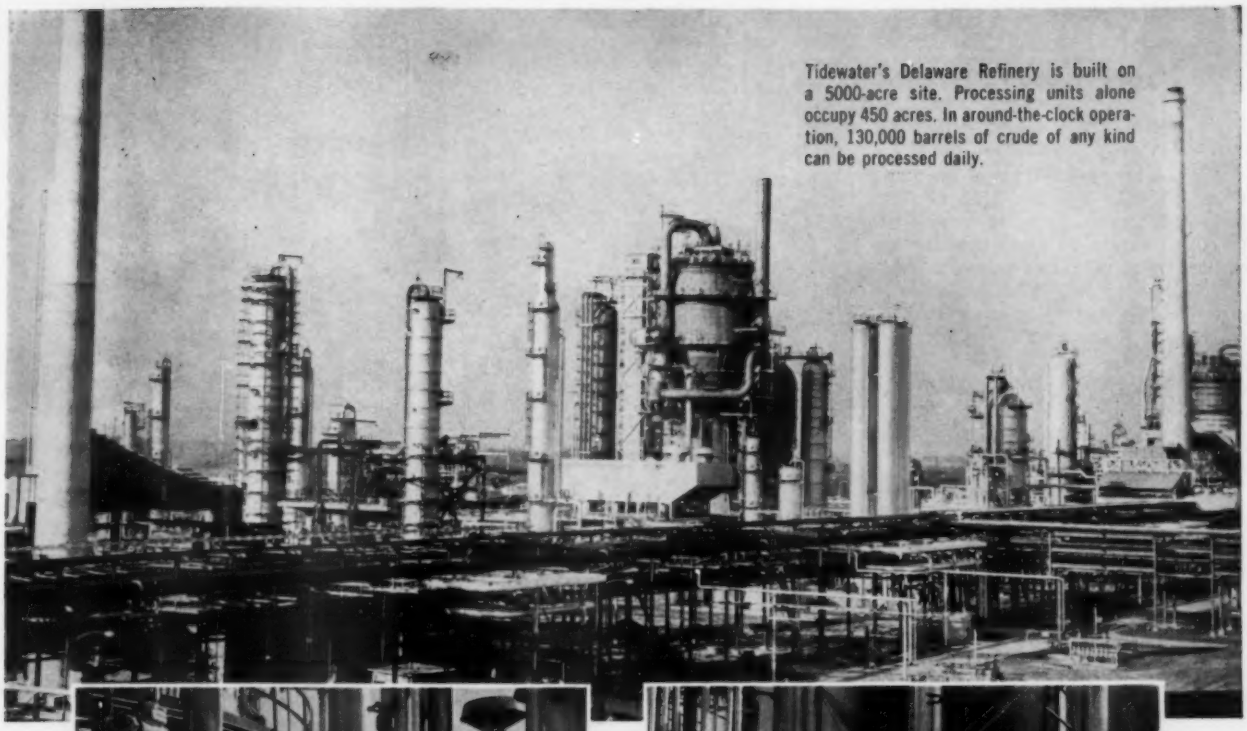
PROTECTION

. . . by CONSOLIDATED SAFETY RELIEF VALVES. The Orthoflow fluid catalytic cracker at Tidewater's Delaware Refinery is the world's largest. It is equipped with Consolidated Safety Relief Valves as are the propane storage bullets. These valves assure absolute protection through peak performance and consistently positive action, even where "superimposed" back pressure is in the relieving system.

Consolidated Safety Relief Valves are "2 in 1" valves with interchangeability so highly perfected that the Standard valve can be converted to the Balanced Bellows Seal type *in the field*. Standardized inlet and outlet face-to-face dimensions permit these valves to be interchanged with those of some other manufacturers.

Fewer functional parts and precision machining and alignment of parts assure long valve life and less maintenance.

MANNING,



Tidewater's Delaware Refinery is built on a 5000-acre site. Processing units alone occupy 450 acres. In around-the-clock operation, 130,000 barrels of crude of any kind can be processed daily.

CONTROL

. . . by **HANCOCK VALVES.** The fluid-handling systems in Tidewater's Delaware Refinery must be kept at highest operating efficiency. To help control flow in the vast network of "fluid highways," hundreds of Hancock Valves are installed.

These manually-controlled valves are designed and built to give reliable performance under the pressures, temperatures and piping strains common to the most modern processing plant. All materials used in their construction are carefully selected — rugged strength and durability are engineered into every component. The super-hard seating surfaces are highly resistant to galling, steam cutting, wire drawing, erosion and corrosion. Positive tightness — leak-proof tightness — is assured month after month. Maintenance requirements are reduced to a minimum. Long-life service proves that there is no substitute for the economy of quality found in all Hancock Valves.

MEASUREMENT

. . . by **ASHCROFT PRESSURE GAUGES.** Accurate pressure measurement is essential to maintain product quality . . . to assure capacity performance of equipment and economical production in Tidewater's Delaware Refinery. Ashcroft Duragauges are precision instruments. They employ rotary geared motion — the most efficient and perfect method of transmitting mechanical motion. A choice of stainless steel movement or stainless steel with nylon bearings and pinion gear permits selection to meet specific requirements. Eight different Bourdon tube materials are available. Each Bourdon tube is "whip tested" at pulsating pressures approximately 50% higher than its pressure rating to insure calibration stability. Three case designs and materials and a complete range of dial sizes and pressures also provide for every individual need. Highest sustained accuracy and long service life are assured.

MAXWELL & MOORE, INC.

CONSOLIDATED ASHCROFT HANCOCK DIVISION

STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY VALVES, 'AMERICAN-MICROSEN' INDUSTRIAL ELECTRONIC INSTRUMENTS, *Stratford, Conn.*, 'HANCOCK' VALVES, *Watertown, Mass.*, 'CONSOLIDATED' SAFETY RELIEF VALVES, *Tulsa, Okla.*, AIRCRAFT CONTROL PRODUCTS, *Danbury, Conn. and Inglewood, Calif.* "SHAW-BOX" AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES, *Muskegon, Mich.* **In Canada:** Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario.

MAXWELL MANNING & MOORE INC. M&M TRADE MARK

New Equipment

colors beside white are pastel yellow, buff, blue, and green.

The color pigments used in these tints are fade resistant and durable, the maker claims. They are formulated to reflect almost as large a percentage of heat from the sun as the white color.

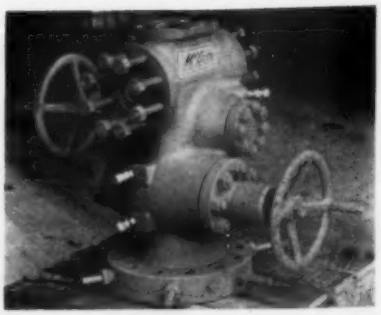
Plasticool paint is a plastic-emulsion resin coating easily applied by spray or brush.

The coating can be thinned with water. But after it dries, it is highly water resistant and durable in all types of weather. Because of its strong adherence to all types of surfaces, the coating eliminates the necessity of using a primer. This coating will last through 4 to 7 years of hard wear, the maker claims. **Write or call: Coating Laboratories, Inc., 325 South Quincy, Tulsa, Okla., for details on Plasticool in color.**

●

New Combination Speeds Christmas Tree Assembly

Faster assembly through the elimination of one major flanged connection in a dual-completion christmas tree is one of the features offered by this new McEvoy combination dual-bore valve and dual tee, a combination of two vital components of a dual-completion christmas tree in a single piece of equipment.



Known as a Type DVT valve (dual valve with integral tee), the unit, when placed atop casing and tubing suspension units, serves all the functions normally served by both a dual valve and a dual tee, according to company officials.

Another advantage cited for the dual valve-tee is that it gives a shorter christmas tree which can be operated by a man of average height while standing on the ground. No special ladders or platforms are needed to reach the uppermost valves.

The dual valve with tee is available in models to handle working pressures of 3,000, 5,000, and 10,000 psi. in all sizes required by industry. The 5,000 and 10,000-psi. W.O.G. models have a flanged top. The 3,000-psi. W.O.G. equipment is threaded for screw type of top connections. The DVT is full bore for complete vertical access to either tubing string for all wire-line operations. **Write or call: McEvoy Co., 600 Milby Street, Houston 1, Tex., for details on DVT valve with tee.**

●

Centrifuge Features Cast-Aluminum Bowl

Features incorporated in this new electric nonheating centrifuge machine include: (1) a bowl consisting of a two-piece aluminum casting with cast-aluminum lid and motor housing, and (2) a rotating arm of high-tensile-strength aluminum alloy.

The machine is equipped with a rheostat switch and pilot light. It is compact and easily installed in the gager's car trunk or truck, according to the maker.

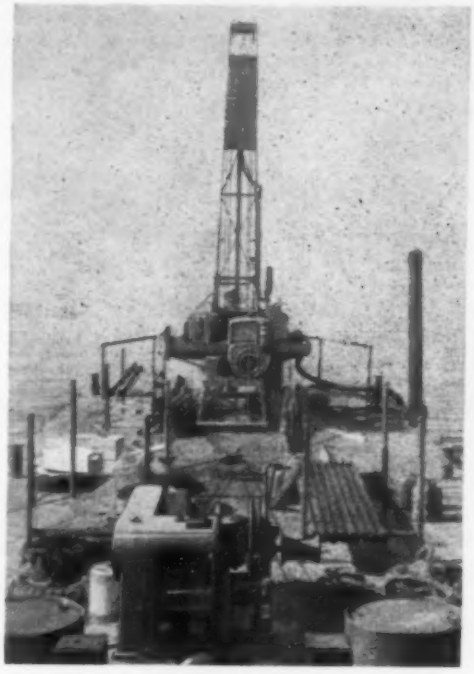
Models are available for both 6 and 12-volt d.c. service for either two or four-tube usage, with either 12.5 ml. A.P.I. or 100 ml. A.S.T.M. tubes. The machine is said to meet both A.P.I. and

WISCONSIN *Air-Cooled* ENGINES

in

Shot-hole barge

"Team Play"



• Operating in Galveston Bay, this off-shore shot-hole barge, equipped with a Mayhew No. 200 drilling machine and two Wisconsin Heavy-Duty Air-Cooled Power Units, renders valuable service for seismograph exploration work.

At the forward end of the barge a Model VG4D 37 hp. Wisconsin Air-Cooled Engine operates the rotary table, the chain pull, Kelly joint and mud pump. The equipment drills to a depth of approximately 200 ft., using special light tubing which carries a cast iron drill similar in action to the old-time "fish-tail" bit.

The Model VF4D 25 hp. Wisconsin engine shown in the foreground, powers a winch and cathead. The winch maintains proper tension on the heavy spuds mounted on the side of the barge, in order to keep the craft steady as the water continues to rise and fall. The cathead is used for lifting and moving heavy material.

This is a rather unusual but more or less typical "team play" assignment for Wisconsin Air-Cooled Engines. Wisconsin High Torque load-holding *Lugging Power hangs on* and *carries on* through the shock load pinches and heavy-duty design and construction provide the in-built stamina that stands up to the job under the toughest operating conditions, at lowest maintenance cost.

You can't do better than to specify "Wisconsin Power" for your oil field utility units.

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World's Largest Builders of Heavy-Duty Air-Cooled Engines

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NEW KIND OF WORK BOAT!

Powered by a *Jupiter*® gas turbine, it is reliable, fast, ideal for many purposes

THIS JUPITER-POWERED LANDING CRAFT introduces a new concept in Navy operations—and also opens new fields of usefulness for commercial work boats. Developed by Solar, in cooperation with the Navy's Bureau of Ships, the 500 hp Jupiter gas turbine demonstrates startling new advantages over conventional marine propulsion units.

During high-speed test runs the 40-foot LCPL nearly doubled the speed achieved with a conventional marine diesel, yet the Solar Jupiter weighs only two-thirds as much as the 165 hp engine it replaced! Compact and light-weight, with a high power-to-weight ratio, the Jupiter is easy to maintain and operates for long periods without overhaul. It can burn a wide variety of liquid fuels, including gasoline, kerosene, diesel oil and others.

Increased speeds reduce the time required for commercial work boat operation—and the Jupiter's low weight and high performance standards can get the job done with lower overall costs. Perhaps this versatile engine can step up your work boat operation. For a new gas turbine brochure write to Dept. D-67, Solar Aircraft Company, San Diego 12, California. *Designers, developers and manufacturers of gas turbine engines, expansion joints, aircraft engine components, and airframe and missile components.*

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• DRILLING RIGS • COMPRESSORS • BUILDINGS

The H_2Oil Gas Gard is a safety device carefully designed and engineered to assure 100% protection against the numerous hazards involved where wet gas installations prevail. Its diversified applications make this unit a "MUST" where safety and economy are the prime objectives. Positive shut-off. 4" x 30" 125#—$54.50, F.O.B. Tulsa, Okla. Available in any size and pressure.

U. S. Pat. 2,710,666 Canadian Pat. 523,467

H_2OIL "GAGE IT"

- NO BATTERIES
- ACCURATE MEASUREMENT
- EASY TO READ
- SIMPLE TO OPERATE
- NOTHING TO WEAR OUT
- A NECESSITY FOR ALL PERSONS WHO MEASURE OIL
- ADAPTABLE TO ANY GAGE LINE

The H_2Oil "Gage-it" retails for $42.50. Approximate Packaged Weight Two Lbs. Standard Length Gage Tapes Available on Request.

The "Gage-it" is a device for determining the Water-Oil interface in a stock tank when attached to any standard type gauge line. It will also determine the Water-B.S. interface provided the B.S. carries enough water that a current may be established from the shell of the tank to the gauge plumb bob.

H_2OIL ENGINEERING CORP.

1601 South Yale **TULSA 16, OKLA.** P. O. Box 5094, Donaldson Station

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SHOWCASE . . .

New Equipment

A.S.T.M. specifications. **Write or call: L. K. Pump Valve Co., 632 North Edgewood, Houston 11, Tex., for details on electric nonheating centrifuge.**

•

Converter Changes One-Phase To Three-Phase Power

Weighing only 39 lb., this new Kato converter changes single-phase 115-volt, 60-cycle power to three-phase 230-volt 60-cycle power. Frequency is held constant within a fraction of a cycle, the maker claims.

The aluminum-alloy frame houses the capacitator starter and both output and input receptacles. The frame is about 10 in. high, without a carrying handle.

The intake and exhaust-air vents are located in the lower halves of endbells to make the converter dripproof. **Write or call: Kato Engineering Co., Mankato, Minn., for details on phase converter.**

SHOWCASE . . .

New Literature

Turbine Flow Meters. New eight-page Catalog 10C 150 explains and illustrates the operation and advantages of Fischer & Porter turbine flow meters for the precise measurement of liquid flow. The catalog contains an exploded view and a cutaway drawing of the turbine meters. It also explains and illustrates the applications of the meters. **Write or call: Fischer & Porter Co., 75 Jacksonville Road, Hatboro, Pa., for turbine flow meters Catalog 10C 150.**

●

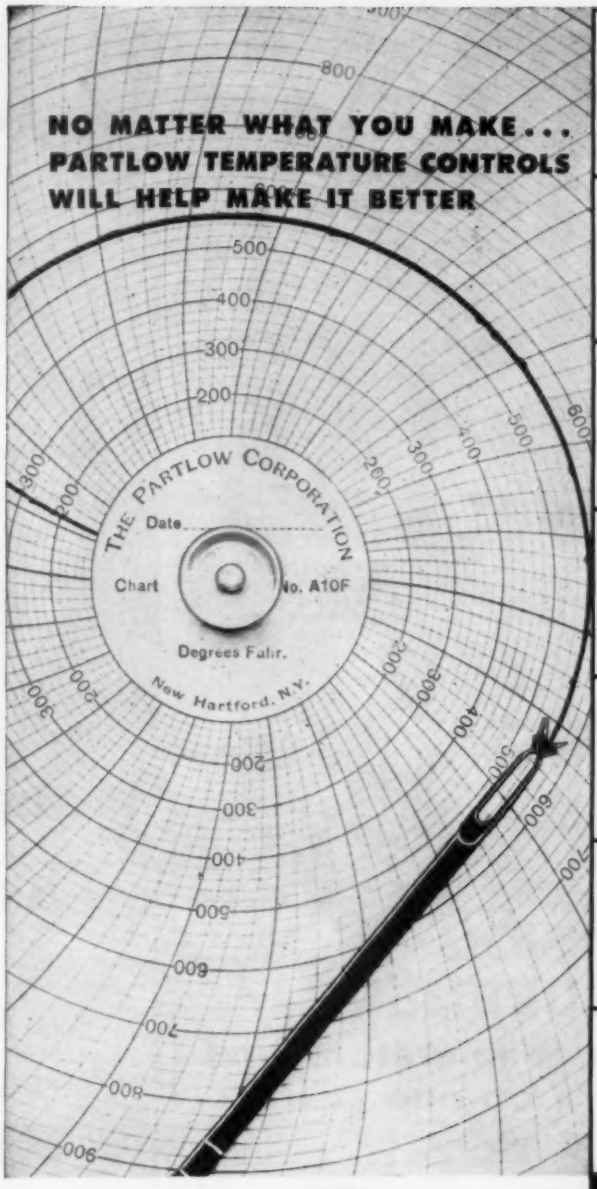
V-Belt Drives for Oil-Field Drilling Rigs. This new 16-page manual containing useful data on V-belt drives for use on drilling equipment furnishes the basic information necessary for proper design of slush-pump, compound, and draw-works V-belt drives and realistic horsepower ratings for primary drives of drilling equipment. Horsepower ratings in the brochure are said to be compatible with the horsepower being transmitted on actual drives. Ratings are based on severe service conditions. **Write or call: Goodyear Tire & Rubber Co., 1144 East Market Street, Akron 16, Ohio, for manual on V-belt drives for oil-field drilling rigs.**

●

Automatic Engine Stop Valves. New eight-page Bulletin S-3A explains and pictures a combined throttle and automatic engine stop valve used to automatically shut down a turbine, compressor, or engine in the event of overspeed or runaway. The bulletin features typical installation diagrams, various tripping mechanisms, sequence of operation, parts list, dimensions, and specifications. **Write or call: Golden-Anderson Valve Specialty Co., 1266 Ridge Avenue, Pittsburgh 33, Pa., for Bulletin S-3A.**

●

Proportioning Pumps and Diaphragm Valves. New 12-page Catalog 800 describes in detail four basic models of proportioning pumps for use in accurate and positive proportioning of flow in the range of 0 to 730 gal. per hour. It shows the materials of construction, capacities, and pressures for each model. The catalog also describes diaphragm valves for positive closure. Of particular interest is the section on plastic valves and diaphragms. Plastic valves for temperatures up to 300° F. are shown. A diaphragm material chart provides a diaphragm selection for such



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Whether you make foods, plastics, metals . . . or what have you . . . there's a Partlow Temperature Control that's just right for your own operations . . . in the range from –30°F. to 1200°F.

Direct acting . . . interchangeable elements . . . accurate calibration . . . long life . . . low initial cost . . . low upkeep.

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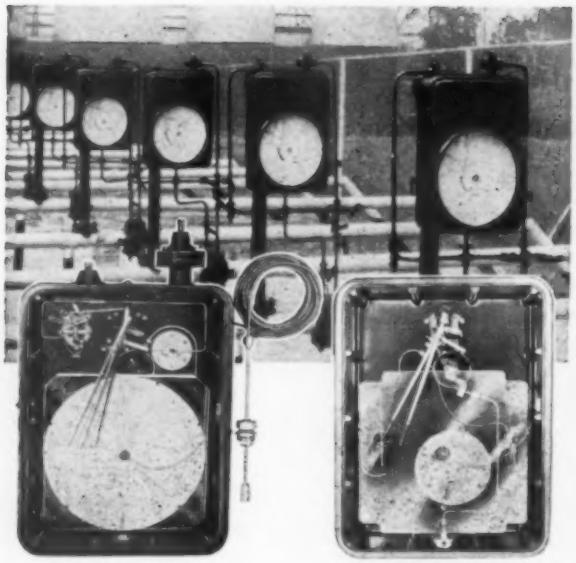
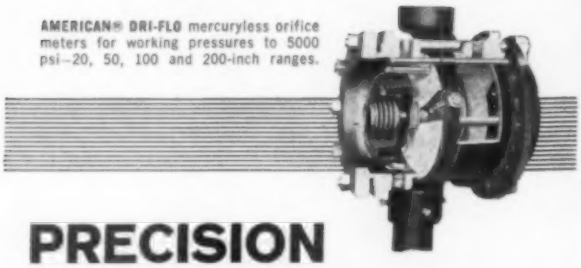


AMERICAN-WESTCOTT Series A-88 recording orifice meters for flow, pressure and temperature measurement—working pressures to 5000 psi—10, 20, 50, 100 and 200-inch ranges.

CANNON METER PENS for recording meters, available if desired, provide clear, legible chart records—hold up to a year's supply of ink.

AMERICAN® DRI-FLO mercuryless orifice meters for working pressures to 5000 psi—20, 50, 100 and 200-inch ranges.



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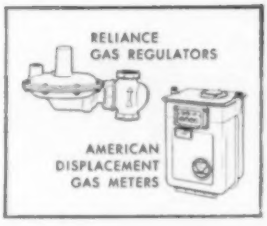

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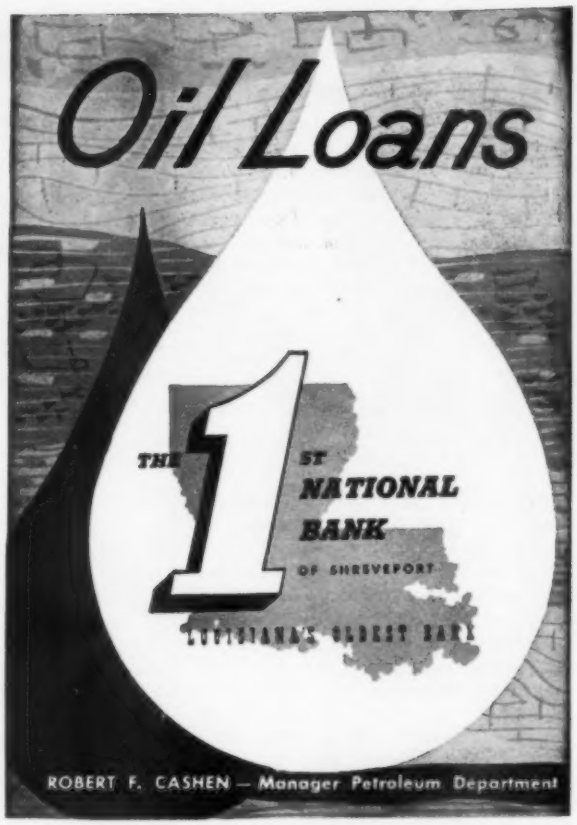

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Steel Buildings ranging from shed roof to gable types for use as warehouses, garages, or offices are the subject of new 36-page Manual SX-2056. It covers such subjects as: (1) panel construction; (2) erection; (3) fire and lightning protection; expansion, rearrangement or relocation; and (4) interior treatment and finish for five types of Armco steel buildings. The manual, designated as AIA File No. 141, contains numerous tables. It is well illustrated with drawings and photographs of typical installations. **Write or call: Product Information Service, Armco Drainage & Metal Products, Inc., Middletown, Ohio, for Manual SX-2056.**

•

Corrosion Inhibitors to increase oil production are discussed in detail in this new 22-page booklet. Titled "Armour Organics for Increased Oil Production," the booklet covers the application of polar cationic chemicals in both primary and secondary oil production. It explains the relationship between corrosional and microorganisms and reviews the chain reaction caused by sulfate reducers. The illustrated booklet reports results of actual field tests. Other chapters cover bactericides and algaecides, description of recommended chemicals, and case histories. **Write or call: Armour & Co., Chemical Div., 1355 West Thirty-third Street, Chicago 9, Ill., for booklet, "Armour Organics for Increased Oil Production."**

•

Open-Hole Cement Plugs. This new 10-page booklet describes the use of reciprocating and rotating scratchers and centralizers to condition hole in preparation for placement of open-hole cement plugs. It includes facts about both reciprocating and rotation in hole conditioning together with comparative costs. A typical problem is analyzed, and recommended practice is described and illustrated. **Write or call: B & W, Inc., P. O. Box 5266, Houston 12, Tex., for booklet, "Open Hole Cement Plugs."**

•

Expendable Perforator for Well Casing is pictured and explained in new four-page Bulletin 6166. Entitled "Precision Perforating With Birdwell Selecto-Jets," the bulletin gives the performance, design, and methods of using these encapsuled shaped charges in

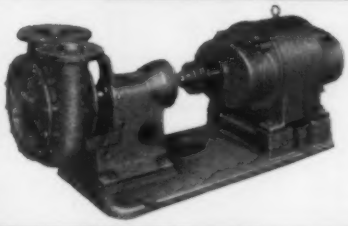

Fig. 3715 single-stage, side-suction centrifugal pump with capacities to 800 GPM and heads to 300 ft. In 10 sizes from ¾" to 3". Temperatures to 350°F. Send for Bulletin 725.4.

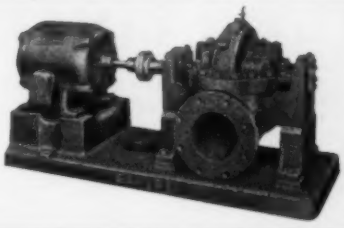

Fig. 3405 single-stage, double-suction centrifugal pump with capacities to 6400 GPM and heads to 425 ft. In 33 sizes from 3" to 12". Temperatures to 350°F. Request Bulletin 721.6.

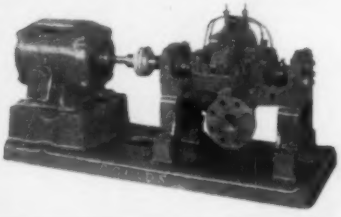

Fig. 3305 two-stage, opposed-impeller centrifugal pump with capacities to 1200 GPM and heads to 1000 ft. In 8 sizes from 1½" to 4". Temperatures to 350°F. Described in Bulletin 722.6.

How to keep salt water from chewing holes in your pump budget

Does salt water give your pump ulcers?

You can stave off this costly damage with a pump alloy that's both tough and hard — Nickel-Aluminum-Bronze (Goulds No. 1121).

Your pumps will resist abrasion, too, if they're Goulds pumps built with this new alloy. Toughness and hardness in Goulds 1121 Bronze (Nickel-Aluminum-Bronze) combine to give a high degree of resistance to abrasion, excellent resistance to failure from attack by sand, salts, slurries, and cavitation erosion. Here's how this special material performs:

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You can get this extra protection against destructive salt water—in the three pumps shown above. Just specify the fluid end in Goulds 1121 Bronze.

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If you want more specific information on any of these pumps, send for the bulletins listed in the illustration.

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conjunction with an integral gamma-ray detector. **Write or call: Birdwell, Inc., 21 Holley Avenue, for Bulletin 6166.**

•

Gasket Kits. This new four-page bulletin offers a parts list covering gasket kits made by Braden Winch Co. The front of the bulletin illustrates the 11 different envelopes that contain the gaskets. Page 2 outlines the advantages of having gaskets in kit form. Page 3 lists the gaskets by part number in each kit, and page 4 recommends the best oil to use when rebuilding a winch. **Write or call: Braden Winch Co., Broken Arrow, Okla., for Parts List No. GK-5702 and Price List No. BWGK-5701.**

•

Combined Record Gages. Eight-page revised Bulletin 1009, Rev. 6, covers Rockwell combined record gages for large-volume gas measurement. The bulletin explains the purpose, operation, construction, and features of the gages. Installation photos and cutaways show their operating functions and applications. The bulletin also reviews in detail methods of calculating corrected volume with both clock-driven and meter-driven combined record gages. **Write or call: Meter and Valve Div., Rockwell Mfg. Co., 400 North Lexington Avenue, Pittsburgh 8, Pa., for Bulletin 1009, Rev. 6.**

•

Glass Foam Insulation. This set of six specifications covers the application of glass foam insulation, trade named Foamglas, for use on industrial equipment and piping at temperatures ranging from —70° to +400° F. Each booklet contains tables of suggested thicknesses of insulation to be applied, detail drawings of installation procedure, insulation supports, and recommended finishes. **Write or call: Pittsburgh Corning Corp., One Gateway Center, Pittsburgh 22, Pa., for specification booklets on Foamglas insulation.**

•

Pulse Code Telemetering Bulletin CP-3012 covers temperature recording by telemetering, remote control of valves and pumps, and serial or parallel-entry data printers. The new 28-page bulletin, alphabetically indexed for reader ease, describes systems for liquid level and temperature telemetering. It furnishes data on receivers, remote selectors, transmitters, and temperature converters. **Write or call: Vapor Recovery Systems Co., 2820 North Alameda Street, Compton, Calif., for Bulletin CP-3012.**

EQUIPMENT MEN . . . in the News

Halliburton Transfers Cahill to Fort Worth

JERRY CAHILL

Jerry Cahill has transferred to Halliburton Oil Well Cementing Co.'s Fort Worth office as sales engineer for electrical well services, according to Wilfred Tapper, vice president for electrical well services. Cahill joined Halliburton as an electrical well services trainee in 1953. Following field experience in West Texas, he transferred to the company's electrical well services research laboratory at Houston for a year's training in advanced log interpretation and reservoir engineering.

Johnston Testers Moves Far West Headquarters

Streamlining of its Far West operations has been effected by Johnston Testers, Inc., in its move to a new 60 by 120-ft. structure in Long Beach, Calif. This is now the headquarters for Johnston's western area and Los Angeles. Heading the western area as manager is R. H. Stainer. Formation and casing testers working under Stainer are C. H. Weaver, H. E. Johnson, B. R. Bassham, H. H. Bochat and J. D. Hager.

Franks Named Manager of New J & L Product Dept.

HENRY FRANKS

W. L. Wolfe, vice president, sales, of Jones & Laughlin Supply Division, has announced the establishment of a new product department in the firm's general office at Tulsa. The new department will be known as the subsurface equipment section. Henry Franks, formerly special representative, has been appointed as manager of this section.

Products to be handled by the new department include sucker rods, subsurface pumps or working barrels, floating equipment, well heads and christmas trees. Franks' duties will include all phases of sales promotion for these products through J&L's line sales force as well as general staff administration in Tulsa. Prior to joining J&L in 1950, Franks was with Carter Oil Co. and Standard Oil Co. of Venezuela.

Cameron Names General Manager for English Plant

E. E. PARKER

Edward E. Parker has been appointed general manager of Cameron Iron Works, Ltd., Leeds, England, according to John H. Grubb, manager of the firm's international division. Parker has been in England since 1951 serving first with an affiliated company, British Oilfield Equipment Co., and for the last 2 years as factory manager of Cameron's own plant in England. He started with Cameron in 1941 after working 2 years as a roughneck in South Texas oil fields.

Foster Cathead Holds Sales Meeting at Wichita Falls

Foster Cathead Co.'s sales force assembled recently for a 3-day sales meeting at company headquarters in Wichita Falls, Tex. The Foster casing tong with hydraulic lift is shown in foreground. Pictured are: Marvin Peck, Houston; R. D. (Dobbin) Cloninger, Lafayette, La.; Glenn E. Tedford, Wichita Falls; Buster Mauck, Great Bend, Kans.; Tom Linny, Wichita Falls; Garnett Edwards, Edmonton, Alta., Canada; Harold Garlick, Oklahoma City; J. Lewis Foster, Wichita Falls; Floyd Moore, Casper, Wyo.; Bill Nelson, Farmington, N. M.; Jack Parks, Odessa, Tex.; F. M. Farrier, Wichita Falls; Jerry McCrary, Corpus Christi, Tex.; W. W. Foster, Wichita Falls.

Hill Organizes New Tulsa Firm to Build LACT Units

Major Engineering Co., a new manufacturing firm which will build lease automatic custody transfer units, began operations August 1, with offices in Tulsa, according to the firm's president, Ralph W. Hill. The company is engaged in the design, manufacture, and sale of

skid-mounted, completely unitized meter-type lease automatic custody transfer units which will automatically measure, sample, test, and run crude oil from the lease to the pipeline, eliminating the conventional tank battery and hand gaging.

Hill, who recently resigned from Pan American Petroleum Corp. to start the new business, has had 15 years of oil-field equipment design, utilization and manufacturing experience. He designed skid-mounted meter-type LACT units for Pan American, as well as the calibrated tank-type LACT unit, now licensed to National Tank Co.

Stone & Webster Names Carter to London Office

Robert J. Carter, district manager of Stone & Webster Engineering Corp. in Houston, has been named a special assistant to the managing director of E. B. Badger & Sons, Ltd., of London, a subsidiary of Stone & Webster.

According to T. C. Williams, president of Stone & Webster, Carter is familiar with British operations of the firm through his previous work in 1949 and 1950 in the process and design engineering for the British Petroleum chemicals project in Scotland.

Carter joined Stone & Webster in 1939 as an engineer in the Boston office and worked on various petroleum, chemical, and gas engineering and construction projects in the U. S. On his return from Britain in 1950, he was named district manager in Houston.

Vinson Supply Announces Management Changes

J. M. McReynolds, formerly president of Vinson Supply Co., will be vice chairman of the board and chairman

L. O. BARNETT

T. B. LOWARY

of the executive committee, according to Bailie W. Vinson. Vinson will become president. Louis O. Barnett has been named executive vice president in charge of operations, and Vice President Thomas B. Lowary has been appointed manager of the Tulsa area. Both Barnett and Lowary will serve on the board of directors and as members of the executive committee.

Barnett has been with Vinson Supply since 1939 and has recently been Tulsa area manager. Lowary joined the Vinson organization in 1951, after having served several years as a petroleum engineer with a major oil company.

Vinson Supply Co. has warehouses in Tulsa, Dallas, Houston, Odessa, Amarillo, and Farmington, N. M. Sales offices are maintained in Oklahoma City and Kansas City.

National Supply Appoints In Canada, Opens Store

H. L. PLANCHE

Hugh L. Planche has been appointed division tubular manager for the Canadian division of The National Supply Co. His headquarters will be at Calgary, Alta. Planche succeeds B. J. A. Sturrock. National Supply has opened its ninth Canadian oil-field supply store at Whitecourt, Alta. The store will serve the Kaybob-Virginia Hills region previously covered from the Edmonton store. C. L. Bentley, formerly manager of the Redwater, Alta., store, is store manager, under the supervision of Rob-

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JET-LUBE #9 *sticks* to wet joints... tenacious to metal. *Protects* against salt water and corrosion. *Withstands* excessive hole pressures and temperatures. *Preserves* thread life.

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on RIG 6 of the CIRCLE DRILLING COMPANY

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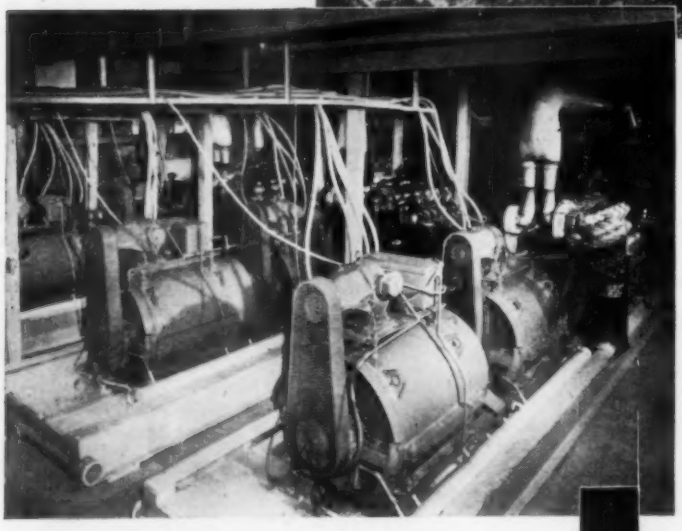

• Circle Drilling Company's 143-ft. Rig No. 6—mounted on their 52 x 220 ft. barge *Kirk C. Lewis* which operates in water to 18 ft. in depth—is one of the world's largest Diesel-electric outfits. Shown here at Week's Island, La., it is drilling a 17,000 ft. well for a major oil company.

Three Waukesha V-12 Diesels—each driving two 540 KW, DC generators—supply power for the Ideco E-2500 drawworks, and rotary; and two Emsco D-1000 slush pumps. These three Waukesha V-12 Diesels are Model VLRDBSU—12-cyl., 8½ x 8½-in., 5788 cu. in., counterbalanced crankshaft—have exhaust driven dual turbochargers for extra power.

Two additional Waukesha Diesels—driving two 200 KW, AC generators—supply power for rig lighting and other auxiliary needs. The mud-mixing pump is an Emsco D-300. These two Waukesha Diesels are Model NKDBSU, 6-cyl., 7 x 8¼-in., 1905 cu. in., turbo-supercharged engines with counterbalanced crankshafts.

Send for Bulletins 1663 and 1634

WAUKESHA Engines and Power Units: 10 hp to 1235 hp—
Turbocharged and Normal Diesels • Natural Gas • LP Gas
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Stand lifts, holds, tilts 55 gal. barrels
Prevents spillage—easily loaded.

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WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

ert M. Borden, district manager of the northern Alberta district.

At the conclusion of a 1-year training program, Planche served as chief store clerk at Stettler and Edmonton and became a sales representative of the division office at Calgary in 1955. In his new capacity he will direct the sales and service in Canada of all tubular products.

Hydril Boosts Galligan To Top New Orleans Post

Les Galligan has been promoted by Hydril Co. from sales representative in Corpus Christi to sales supervisor in New Orleans.

Galligan, who joined Hydril in 1949, trained at the Houston factory and served several years as a salesman in New Iberia before being transferred to Corpus Christi. In his new capacity, Galligan will supervise the sales of Hydril equipment in the Louisiana Gulf Coast area.

McCullough Opens New Canadian Service Branch

LLOYD RUSSILL

A new service branch has been opened by McCullough Tool Co. at Whitecourt, Alta., Canada, according to Norman Brookes, Canadian division manager.

In charge of operations at this fully equipped branch is Lloyd Russill, a veteran in the Canadian oil fields with 12 years' experience in all types of electric wire line services. Assisting Russill are Carl Hieman, service unit operator, and Jim Fairweather, serviceman.

Being centrally located in oil areas in Alberta, McCullough Tool Co. will provide prompt, 24-hour electric wire line services to the area.

Lane-Wells Announces Promotions, Appointments

Jerry Maurice has been promoted to manager of the Wichita Falls area of Lane-Wells Co. James M. Liles has been promoted to station manager at Haskell, Tex., and William H. Perkins has been named district sales engineer at Sweetwater, Tex.

Prior to his promotion, Maurice served as station manager at Haskell.

It pays to get this "shopping habit"!

In today's rush of getting everything done yesterday, do you often order operating supplies at the rig? Have you gotten out of the habit of dropping in at the supply store? If so, you may be overlooking the important advantages you gain from careful "in the store" buying.

Continued on next page

Look at it this way—the National Supply Store in your area anticipates your operating needs, stocks only top quality tools, parts, accessories and supplies. Most of these items are displayed in bins, counters and warehouse areas for your personal inspection, comparison and selection. You can *choose* the items that best meet your special needs. You will also find that the National store crew is a virtual encyclopedia of information on equipment ratings, advantages and the kind of performance you can expect from any item.

Occasionally, you may need an unstocked item. They'll order it for you on the spot, make sure it is sent the fastest way possible.

The small amount of time it takes to do "in the store" shopping and *planned* buying can save you money and time—savings you can't make buying at the rig on an emergency order basis. Moreover, you'll be better informed on the newest products available for your use.

Planned National Supply Store buying will give you more on-the-job time and greatly reduce the necessity for emergency orders. Let the National Store personnel near you show you how it really pays to get this "shopping habit."

Rugged, powerful National Rigs pay off in every kind of hole

80 to 1600 horsepower

"Blue Iron" is a familiar oil country term to several generations of drillers. To them, it has meant rigs that give long, trouble-free service under adverse conditions. Today, in addition to these qualities, drillers know that "Blue Iron" can play an important part in drilling contract negotiations.

What does all of this mean? That National Rigs consistently turn in top level performance on every kind of drilling operation—from shallow, workover or servicing to the world's deepest wells. The widespread use of National Rigs confirms such performance.

This top performance starts with the design and quality manufacture of rigs at National Supply. Years of close association with your drilling problems insure correct, modern design. In manufacturing and assembly, the latest techniques and methods are used. There's great attention to hundreds of construction details—details that can be all-important on a fast drilling schedule. On location, there's service nearby if you need it from the oil country's largest supply company.

Remember these facts on your next rig purchase. It will pay you to investigate the operating economy of "Blue Iron."

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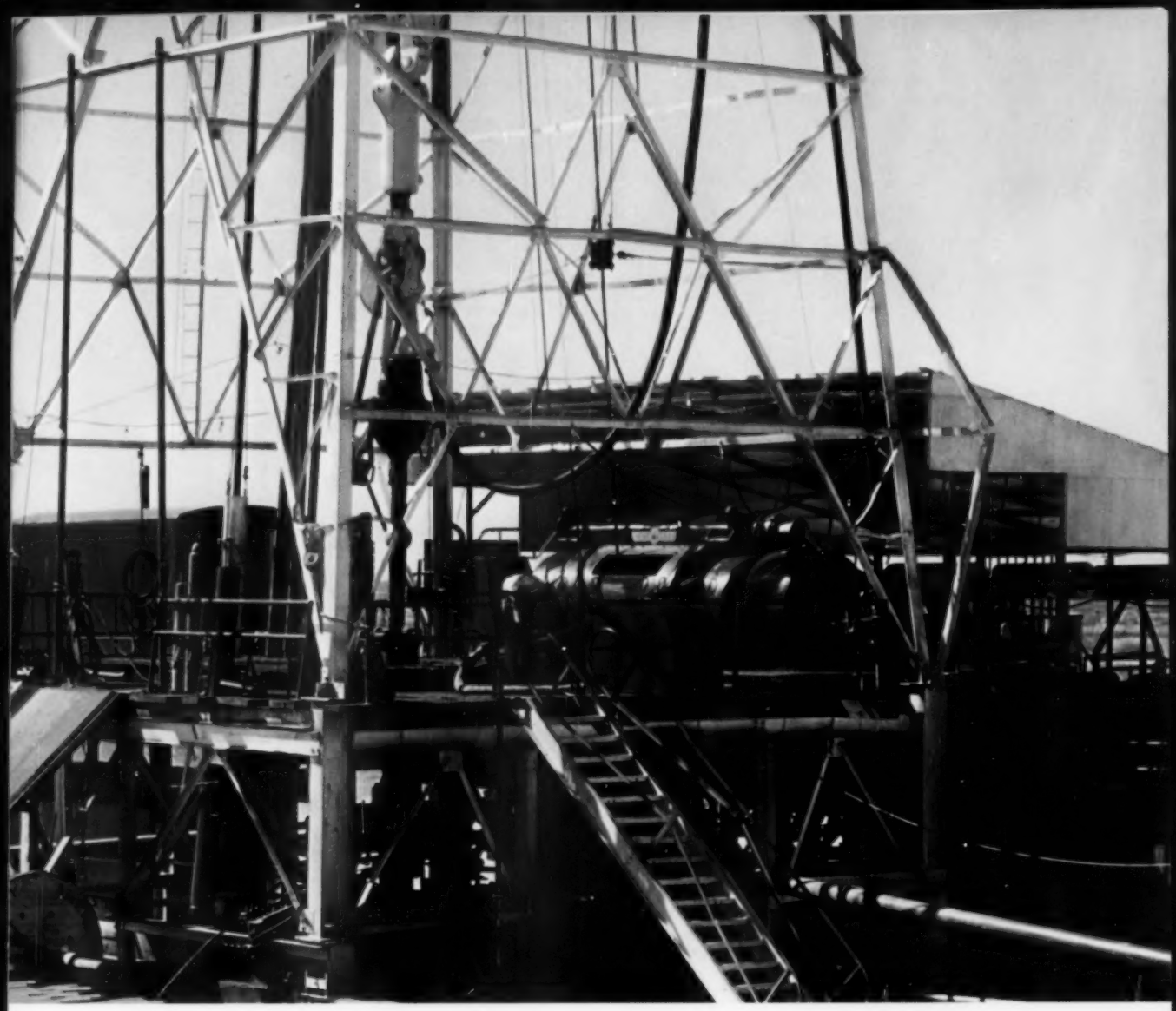
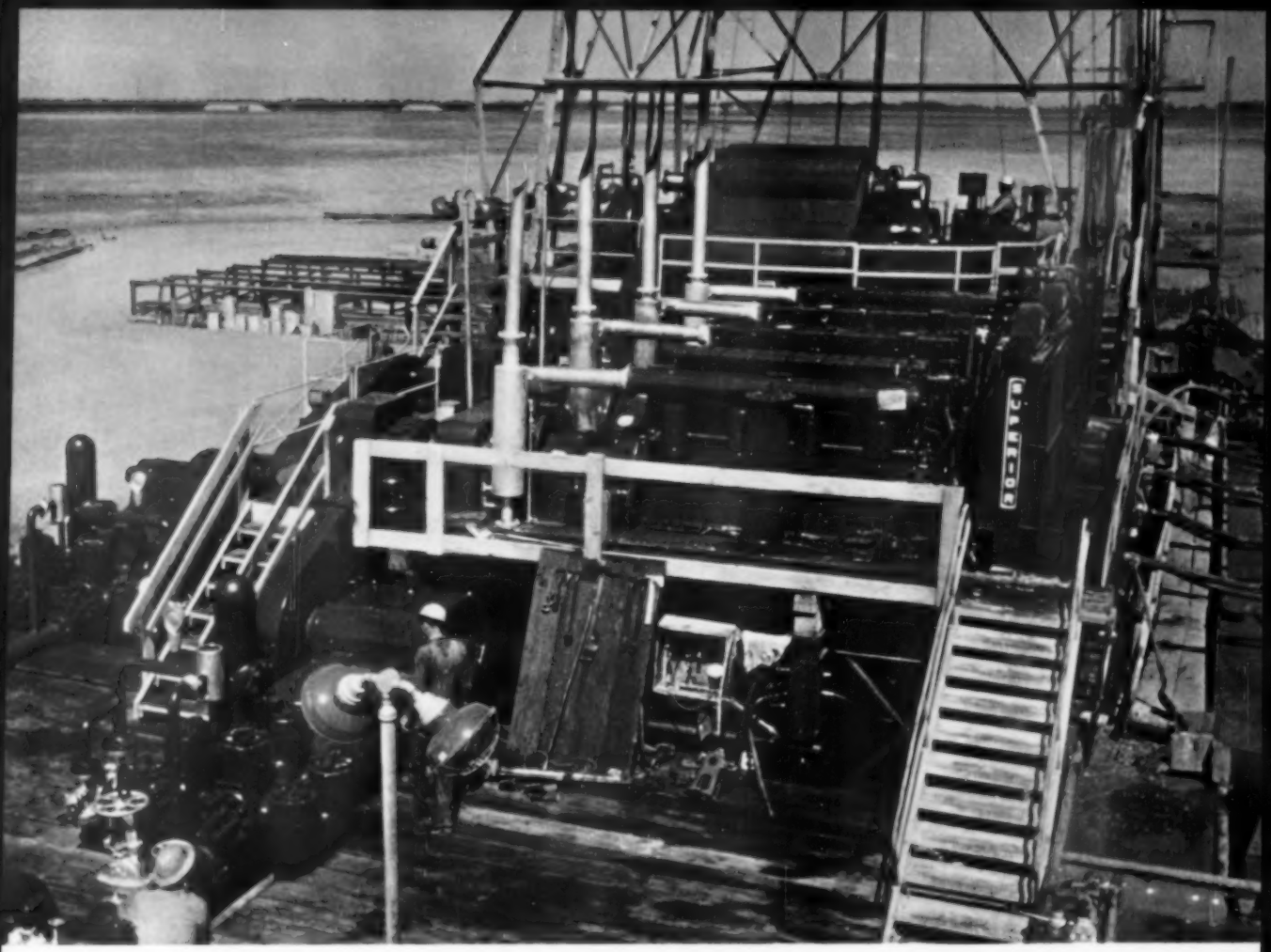
NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT

SPANG STEEL PIPE AND ELECTRICAL CONDUIT



National's complete line of 10 rigs serves every drilling range—from shallow well, well servicing and workover to the world's deepest wells. For truck or trailer mounted operations, the following National Rigs are available: T-8, T-8-S, T-12, T-12-S, T-20, T-20-S, T-32—in a range of horsepower from 80 to 320. For medium to deep drilling (on land or offshore), these National Rigs are available: Type 55, 80-B, 110, 130, 160—in a range of horsepower from 550 to 2,000. Be sure to ask your local National Supply Store or Representative for complete information and descriptive bulletins on these top performers—proved in service throughout the world.

Want effective power transmission? See next page



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National Drive Groups are matched and designed for smooth, trouble-free power transmission between engines and rig, rotary and pumps. Compact and easy to transport, they are simple to rig up and tear down.

Here are some of the outstanding features of National Drive Groups:

Sectionalized construction—each drive group section is a completely self-contained unit.

Wide Power Range—flexible engine and drive combinations ranging from 200 to 2000 hp.

Slush Pump Drives—available for one, two or more pumps with either single or 2-speed drive.

Drive Group Power Arrangements—National Gyrol Fluid Drive, National Torque Converter, mechanical and electrical alternates are available for your power arrangements.

Get complete information and bulletins on National Drive Groups and Independent Pump Drives at the nearby National Supply store. The National Representative there will be glad to review this material with you.

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NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

Liles was formerly field service operator at Sweetwater. Prior to his recent appointment, Perkins was Gulf Coast division safety engineer.

Canadian Facility Formed By Badger Manufacturing

Badger Manufacturing Co., Cambridge, Mass., has established Canadian Badger Co., Ltd., to engage in the design and construction of oil refining and chemical plants in Canada.

Officers and directors of this company are John C. Starr, president and director; Adrian J. Broggini and William C. Rousseau, directors. Starr is also vice president in charge of engineering and construction for the parent company.

This new undertaking marks the sixth facility for Badger. Other domestic offices are in New York and Houston. Overseas, Badger-Comprimo N.V. is owned jointly by Badger Manufacturing Co. and Comprimo N.V.

SSC's French, English Subsidiaries Expand Crews

Plans for a 40 per cent expansion of seismic crews by French and English subsidiaries of Seismograph Service Corp., Tulsa, have been announced by G. H. Westby, president.

Westby returned recently from a tour of Europe where he discussed plans with officials of Seismograph Service, Ltd., the English subsidiary, and Compagnie Francaise de Prospection Sismique, the French company. The increased activity will boost the number of CFPS seismic crews to nine, with four of them working in the Sahara. A similar increase in the number of crews operated by SSL will be made.

Oilwell Names Rocky Mt., Mid-Continent Appointees

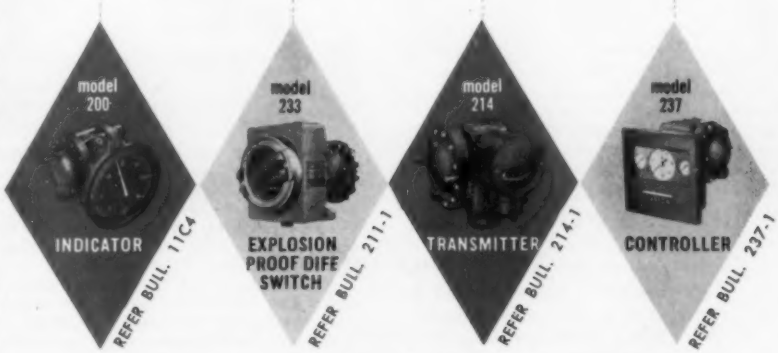
William S. Thielman has been named as United States Steel Corp.'s Oil Well Supply Division assistant to area manager, machinery sales, at Casper, Wyo., and B. J. Ford has been appointed as field representative at Casper, according to R. L. Armstrong, Rocky Mountain area manager.

Appointment of Morris L. Choate as manager of Oilwell's Ponca City store has been announced by Mark Barkhurst, manager of the Mid-Continent area.

Thielman joined Oilwell in 1956 as assistant district engineer, machinery and equipment sales. Prior to his employment with Oilwell, Ford had 5 years' oil-field supply experience.

IN PROCESS INSTRUMENTATION

BARTON BELLOWS TYPE RECORDERS are the answer to industry's metering needs where dependability and precise measurement are essential. Modern in design, BARTON RECORDERS offer the advantages of rugged construction, simple operation, easy installation and low maintenance, combined with fast response and high sustained accuracy. BARTON RECORDERS are available with differential pressure ranges from 0-20"W.C. to 0-50 PSI with safe working pressures to 6,000 PSIG. Static pressure elements are available in ranges from 0-30" M.V. to 0-10,000 PSIG. All units are hydraulically tested and overranged to 1.5 times the safe working pressure, regardless of the differential range.



For further information, contact Barton Sales Representatives in most principal cities. 202-357

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*99.9% plus

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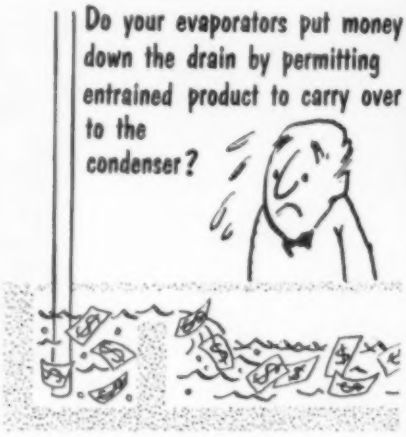

YORKMESH DEMISTERS eliminate overhead entrainment losses

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6 CENTRAL AVE. • WEST ORANGE, N. J.

Choate joined Oilwell in 1947 as a storeman at Ponca City, Okla. Subsequently he held the posts of subsurface pump repairman, field representative and service engineer, all at Ponca City.

W-K-M Breaks Ground for Foundry at Richmond, Tex.

J. S. DOWNS

The ground-breaking ceremony that touched off full-scale construction on W-K-M's new iron and steel foundry was held recently at the 78-acre site in Richmond, Tex. The honor of breaking ground was given J. S. Downs, president of W-K-M, and Judge George S. Roane, county judge of Fort Bend County.

Downs said the new foundry will be a 173,000-sq.-ft. multiple-span steel and corrugated sheathing building. There will also be a 1½-acre pattern storage building. Facilities at the foundry will make it possible to pour 600 tons of steel and 400 tons of iron castings monthly, and the foundry will have its own chemical and physical testing laboratory. Production is anticipated at the new facility in about 1 year.

IH Appoints Southern California Distributor

International Harvester Co. has appointed Oilfield Engine Distributors, Inc., Long Beach, power-unit distributor for the petroleum and construction industries in eleven counties of southern California. Oilfield Engine Distributors will soon have complete representation by dealers in all of these counties.

A complete line of International Harvester power units and replacement parts is in stock. This includes the recent line of 6-cylinder and V-8 power units introduced by International Harvester.

Principals of Oilfield Engine Distributors are Bob Walker and Carl Spath. Walker has had 13 years' experience working with the International line. Spath was formerly a petroleum engineer for The Texas Co. and sales representative for Eastman Oil Well Survey Co. and Sievers, Inc.

your key to... MORE PROFIT

WICHTEX

Well Servicing Units

Wichtex Units "open the door" to more profit—in well servicing. They provide more capacity, more efficiency per dollar invested. They are designed specifically to require a very minimum of upkeep and repairs. They are outstandingly compact and mobile; models up to 9,000-foot capacity are available within 8-foot width. They have an unequalled record for long life without overhaul. They are your best buy.

Models range from 2,000-foot to 12,000-foot capacity. All models can be equipped with spudding attachment.

Also investigate Wichtex Rotary Rigs for 2,000' to 5,000' drilling.

WICHTEX MACHINERY COMPANY INC.

WICHITA FALLS TEXAS

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Baker & Co. Elects Johnson as Vice President

Collister Johnson has been elected a vice president of Baker & Co., Inc., Newark, N. J. Baker & Co., one of the group of Engelhard Industries, is the producer of the Sinclair-Baker RD 150 reforming catalyst.

Johnson has been petroleum catalyst sales manager since joining Baker in 1955. Before that he was with M. W. Kellogg Co., New York City.

Blaw-Knox Names Midwest Manager, Ass't. Manager

Blaw-Knox Co., chemical plants division, Pittsburgh, Pa., has expanded and reorganized its Midwest headquarters at Chicago and named Benjamin D. Russum as manager. Dr. Hal B. Coats has been appointed assistant manager.

B. D. RUSSUM

DR. H. B. COATS

The Midwest headquarters is a fully integrated organization providing engineering, design, material procurement and construction services for the chemical and petroleum industries of the midwestern and southern states.

Russum joined Blaw-Knox in 1942 and has been project manager in the design and construction of plants for the production of chemicals and petroleum products. A veteran of 15 years with Blaw-Knox, Coats has served as research and development director of the chemical plants division and manager of its atomic energy department.

American MARC Names Berry As Sales Vice President

Lloyd E. Berry has been appointed as vice president in charge of sales for American MARC, Inc., designers and manufacturers of diesel engines and generators, according to W. Denis Kendall, president.

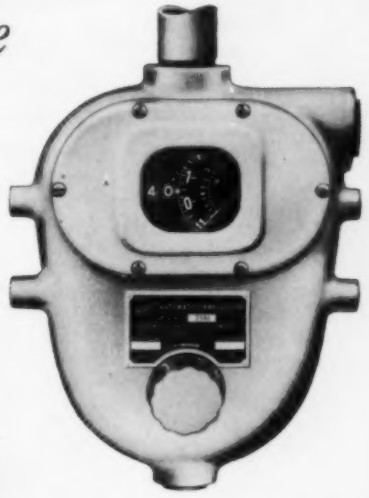
Before joining the company's headquarters in Inglewood, Calif., Berry was distributor of the company's line

7000 SOLD in 7 YEARS!

That's the Field-Tested record of the

"Varec"

FIGURE NO. 2500 SERIES



AUTOMATIC TANK GAUGE

Patent No. 1,879,805
Patent No. 2,555,593
Other Patents Pending

Seven solid years of proven service stand behind the "Varec" Fig. 2500 AUTOMATIC TANK GAUGE. It was first with the NEG'ATOR MOTOR – a feature so good that competition copies. It's not new it's been tested for seven years. Because it is a long-deflection constant force element it is *not* a spring – It is a motor!

When you have to squint into a look-box, even if the gauge tape is clean, you are subject to parallax – (if you are tall, you read the tape *low*; if you are short you read the tape *high* . . . that's parallax). A mis-reading of 1/8 inch can cost you or your customer many barrels of oil on a large tank. Accuracy is assured with the "Varec" Counter and Dial System (Patent claim allowed but not yet issued – other patents pending). Gravity Compensator adjustments made at counter assembly without exposure to tank vapor or pressure. Tank vapors sealed off from counter assembly. Removal of front cover plate will not de-pressure tank. Patented operation checker for testing gauge operation.

There is a Fig. 2500 Series gauge for every type of installation.

Tell your "Varec" representative your gauging problem, our Engineering Department will come up with the correct answer. You will have a gauge that leads the field – that stands for quality and accuracy first and it will cut your "unaccountable losses." That's why the "Varec" Fig. 2500 has a fast "pay-out."

Send for free Bulletin CP-3502 for full information

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in the South and southeastern states. In sales and distribution since 1920, Berry was sales vice president for National Automotive Parts Corp.'s diesel distribution and previously distributor for Black-Decker.

McKee Names Construction Manager, Ass't. Manager

A. E. Somerville has been appointed manager of all construction operations of Arthur G. McKee & Co., according to H. E. Widdell, president. R. G. Widman, construction superintendent for McKee, has been named assistant construction manager.

SOMERVILLE

R. G. WIDMAN

Somerville succeeds the late James H. Sharpe with whom he had worked as assistant construction manager for the past few years. He has been associated with the construction industry 25 years and has served the McKee company since 1940 as assistant construction superintendent; construction superintendent; general superintendent of construction for metals division projects; and assistant construction manager. Widman joined the McKee company as a field engineer in 1948 and was promoted to construction superintendent 3 years later.

Delta Tank Names Queen to Oil Field Equipment Sales

Ben M. Queen has been appointed as a sales engineer in Delta Tank Manufacturing Co., Inc.'s, oil-field equipment division office in Corpus Christi, Tex., according to Ross B. Baze, Delta vice president. Queen has been active in petroleum sales since 1951.

Delta, a wholly owned subsidiary of General Gas Corp. of Baton Rouge, is a leading producer of pressure vessels and other heavy equipment for the petroleum, chemical and petrochemical industries.

Dallas Unit of Wallace Co. Moves to New Facility

The Dallas branch of Wallace Co., Inc., a Texas firm which supplies industrial items, pipes, valves, fittings, welding fittings, flanges and plug valves for all types of oil and gas installations, has occupied a new 7,500-sq.-ft. building in Brook Hollow industrial district, according to R. A. Lynch, manager.

Headquarters of the firm is in Houston, with branches in Corpus Christi and Beaumont.

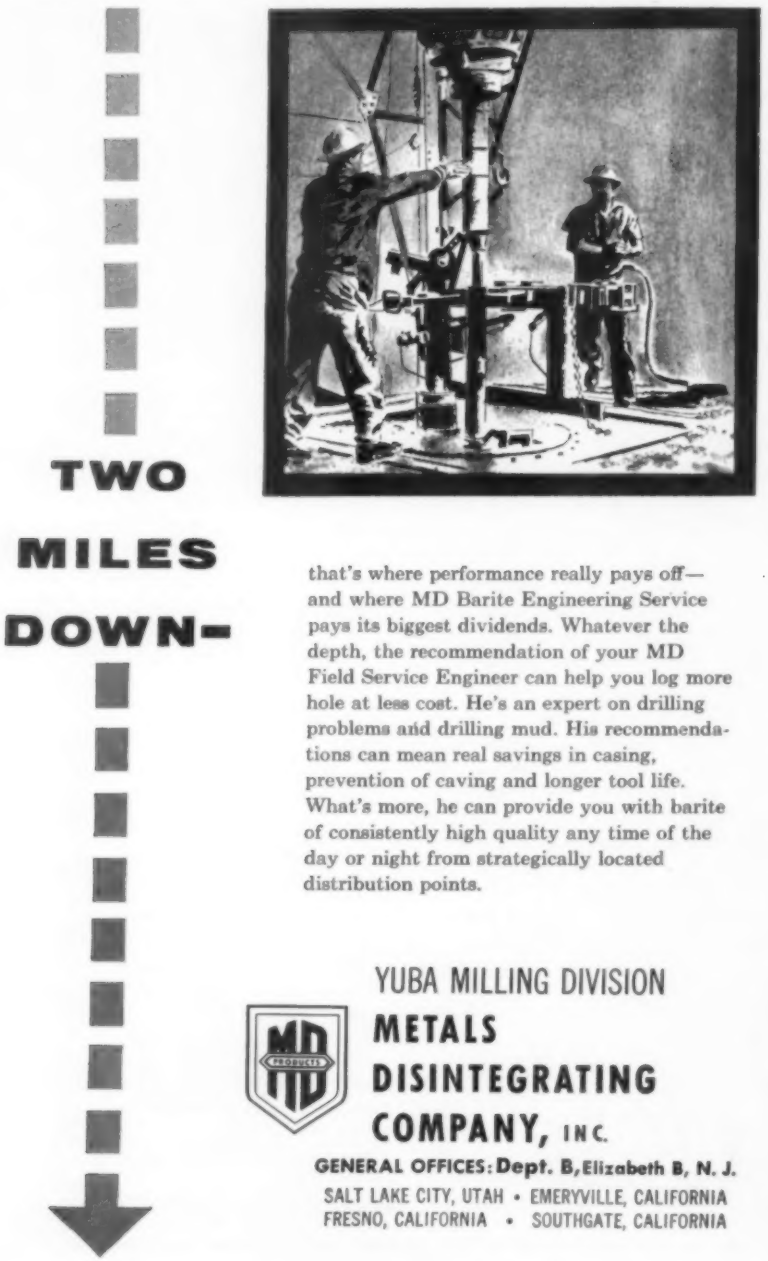
Catalytic Construction Names Manager of Sales

The appointment of Dr. Raymond Wynkoop as manager of sales has been announced by T. Ellwood Webster, president of Catalytic Construction Co.

Wynkoop has had broad experience in the chemical and petroleum fields. He has served with Publicker Industries in Philadelphia, Standard Oil Co. (Ind.), Algonquin Chemical Co., National Distillers & Chemical Co., and Houdry Process Corp.

J&L Completes Negotiations For Acquiring Texas Site

Jones & Laughlin Steel Corp. has completed negotiations for the acquisition of approximately 2,700 acres of land in Chambers County, Texas. This



that's where performance really pays off—and where MD Barite Engineering Service pays its biggest dividends. Whatever the depth, the recommendation of your MD Field Service Engineer can help you log more hole at less cost. He's an expert on drilling problems and drilling mud. His recommendations can mean real savings in casing, prevention of caving and longer tool life. What's more, he can provide you with barite of consistently high quality any time of the day or night from strategically located distribution points.

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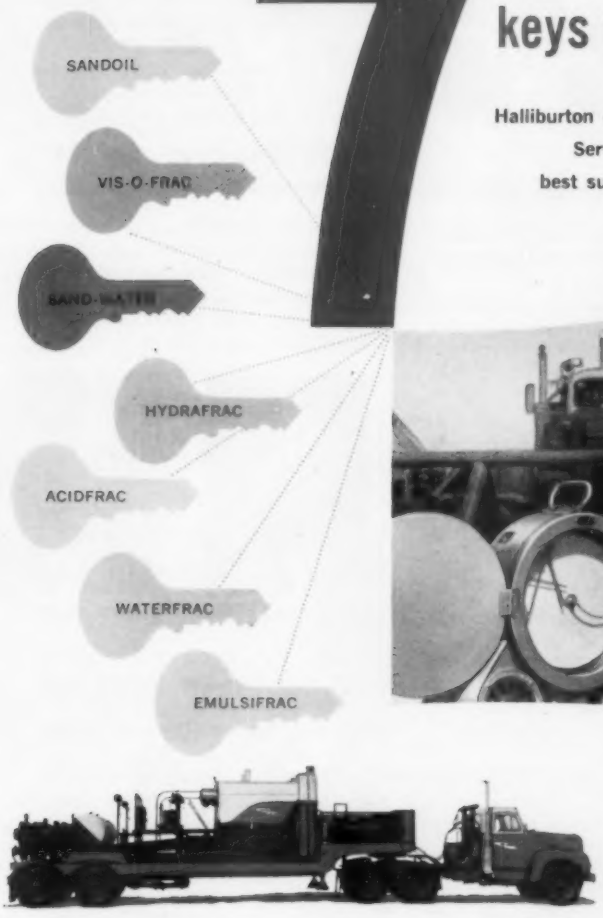
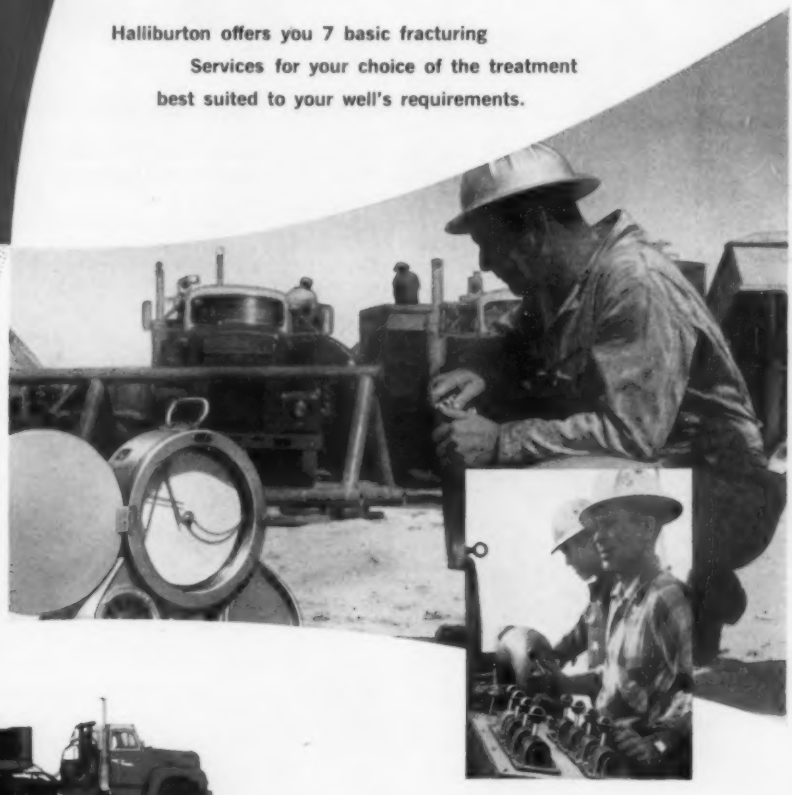
7 keys to production stimulation



Halliburton offers you 7 basic fracturing Services for your choice of the treatment best suited to your well's requirements.



SANDOIL—Refined or crude oil. Economical for big or small volume fracturing jobs.

VIS-O-FRAC—Low cost, low friction-loss thickened fracturing fluid prepared from your own crude.

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4 VARIATIONS OF BASIC FRACTURING SERVICES:

PERFPAC—Method for temporarily sealing individual perforations with balls . . . establishing flow through other perforations to create additional fractures.

MULTIFRAC—A technique for producing multiple fractures. Applicable through perforated casing or in open hole.

BIG FRAC—Large volume, high injection rate treatments for increased fracturing efficiency.

VERTIFRAC—Procedure for creating vertical fractures in open hole.

Call your local office or write the Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

Ask for your free copy of Bulletin: "Elements of Hydraulic Fracturing".

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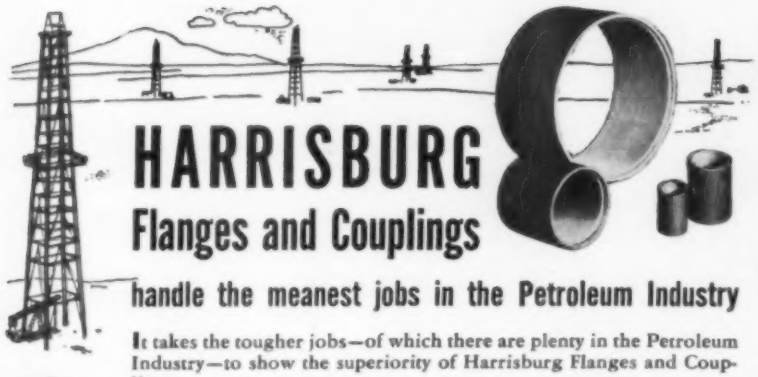
OIL WELL CEMENTING COMPANY, DUNCAN, OKLAHOMA

PIONEERS IN FRACTURING SERVICES

251 SERVICE CENTERS—JUST MINUTES AWAY FROM YOUR WELL



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handle the meanest jobs in the Petroleum Industry

It takes the tougher jobs—of which there are plenty in the Petroleum Industry—to show the superiority of Harrisburg Flanges and Couplings.

Harrisburg Drop-Forged Steel Pipe Flanges are manufactured to A. S. A. Specifications. Steel of a special analysis, careful machining, shot-blasted surface and a dip-coat of rust inhibitive black lacquer all contribute to the high quality of these flanges. They are made in threaded, butt-welding, slip-on welding, Van Stone and blind types.

Harrisburg Seamless Steel Pipe Couplings are made to A. P. I. and A. I. S. I. Specifications. They are threaded by a special process developed by Harrisburg engineers. It produces threads of superior accuracy in form, height, angle and lead. The threads are electro-galvanized to prevent seizing and galling.

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Harrisburg Steel Co. { DIVISION OF HARSCO CORPORATION } HARRISBURG 6, PENNSYLVANIA

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WORTHINGTON CORPORATION, Oil City, Pennsylvania

tract of land fronts on Galveston Bay and Cedar Bayou, from which ready access to the Houston Ship Channel is available. The land is well situated for the construction of a steel mill, and engineering surveys have shown that surface and subsurface conditions are favorable for such construction.

Harkrider, Poole, Dozier Promoted by Sivalls Tanks

Harold Harkrider and Jerry Poole, Jr., have been named by Sivalls Tanks, Inc., as new branch managers at Hobbs and San Angelo, respectively. Bob Dozier, former Odessa area sales and service representative, has moved to Hobbs.

H. HARKRIDER

BOB DOZIER

According to S. P. Kroeker, executive vice president, Hobbs and San Angelo have been elevated to independent branches to strengthen the sales and service program in West Texas and New Mexico. Harkrider has been in charge at Hobbs since September 1956, during which time the New Mexico branch operated as a part of the Odessa-Midland sales district. Hobbs territory now includes all of southeastern New Mexico plus the Texas counties of Gaines, Yoakum, Terry, Cochran and Hockley and the city of El Paso.

Harkrider joined Sivalls Tanks in 1955, working out of Odessa prior to his promotion to Hobbs. Poole started with Sivalls Tanks in 1955 in Odessa. He will continue to cover the San Angelo-Big Lake area, which formerly was a part of the Abilene branch. He has been Sivalls' representative in San Angelo since 1955.

Dozier served as sales and service representative in the Midland-Spraberry-McCamey territory for 2 years before his recent transfer to Hobbs. He joined Sivalls Tanks in 1955.

Truitt Rejoins A. O. Smith

C. B. (Ike) Truitt has rejoined A. O. Smith Corp as a field engineer for the company's meter and service station pump division, working in the area of crude-oil measurement and automatic custody transfer.

Truitt was with A. O. Smith from 1940 to 1947, active in sales of tubu-

Get MOBILITY *plus* SERVICE with Bucyrus-Erie Spudders

You get mobility plus service with a versatile Bucyrus-Erie on your drilling and servicing operations. These modern mobile rigs speed top-to-bottom drilling, drilling-in, or typical workovers. They are designed to assure pacesetting performance hole after hole with quick, easy moves and reduced costs all down the line. They are built to stand up to a full-time diet of rugged duty.

An extra after-the-sale bonus — quality service — is available too. The Bucyrus-Erie distributor near you is ready to fill your drill needs, able to provide fast, dependable parts, tools, and repair service.

For more information on the Bucyrus-Erie best suited to your needs — the field-proved 60-L, 28-L, 36-L, or 48-L spudder — see your distributor now or write direct. 47557

BUCYRUS-ERIE COMPANY, South Milwaukee, Wisconsin

BUCYRUS ERIE

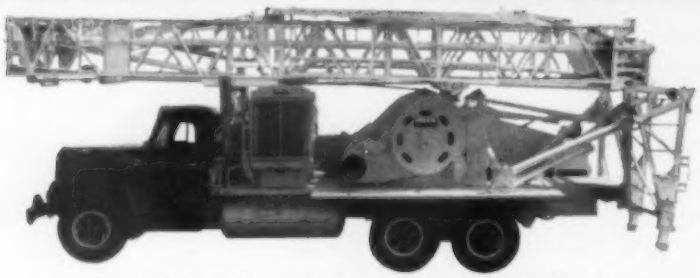
FIRST with the FINEST in SPUDDERS

● ***SHALLOW DRILLING IN RODNEY FIELD*** — John Palenkas, drilling contractor, of Highgate, Ontario, uses a Bucyrus-Erie 60-L to advantage in a shallow oil field near Rodney.

● ***TOP-TO-BOTTOM OIL WELL IN ALBERTA*** — This 48-L, equipped with a 150-ton capacity Tripod Derrick, drills for oil near Odin, Alberta. The rig is owned jointly by Robert Pattie and Boyd Stewart of Cut Bank, Montana.

● ***RUNNING SWAB IN ONTARIO*** — Clarence Demaray of Demaray & Nichols, Drilling Contractors, of Kerwood, Ontario, uses a 60-L to run a swab near the 425-ft. completion depth.

NEW IDECO
Truck Rambler
WITH GUYLESS KWIK-LIFT MAST AND AIR-CONTROLLED HOIST



Shown above is the M-25-S on International R-190 with independent power unit and KM-65-100 D(H) guyless mast

Faster . . TO THE JOB . . ON THE JOB

Here is the world's most modern and efficient well servicing rig — already field-proved from the Gulf to Canada. Let your Ideco man show you why the Ideco Truck Rambler is setting new standards in equipment of its type.

POWER:

- "Uni-Power" design utilizes truck engine for both propulsion and rig operation through 5-speed mechanical transmission or torque converter.
- Independent power unit on integral skid with hoist also available for truck mounting.

HOISTS:

- Choice of 3 sizes with h.p. input ratings up to 145, 200, and 240. Single or double drum.
- Air controls grouped in single panel at hoist.
- High and low main drum air clutches mounted outside hoist frame for convenient maintenance.
- Precision heavy-duty roller chain on all drives . . . alloy steel sprockets with machined, hardened teeth.
- Heat-treated steel shafts mounted on self-aligning roller bearings; clutch sprockets on ball bearings.

MASTS:

- 65-ft. "D" and "C" or 89-ft. "C" telescoping Kwik-Lift masts . . . Model "D" internally guyed or "C" externally guyed.
- Pole type mast specifications available on request.

When only the best will do...

Use IDECO

ONE OF THE DRESSER INDUSTRIES

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lar goods and process equipment. Since 1947 he has held sales managerial positions with Rolo Manufacturing Co., Diamond Oil Well Drilling Co. and Grove Regulator Co.

National Moves Southwest Division Office to Dallas

The National Supply Co. has moved its Southwest division offices to the Dallas Federal Building, Dallas, Tex. In Fort Worth a sales office will be maintained in the Fort Worth National Bank Building.

The new Dallas offices will also become a division headquarters for the field engineering department of National Supply's Spang-Chalfant division.

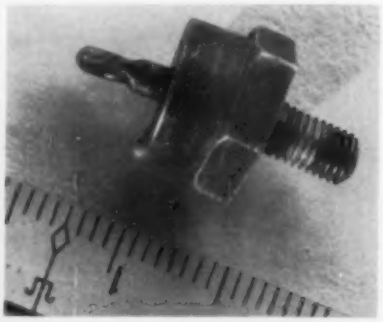
The Southwest division is responsible for the company's operations in its Abilene, Hobbs, Odessa, Shreveport, and Wichita Falls districts, embracing much of Texas and areas in Arkansas, Louisiana and New Mexico.

Oakite Names Technical Service Representative

Francis J. Burns and Wilfrid A. Woolman have been appointed as technical service representatives in Billings, Mont., and Beaumont, Tex., by Oakite Products, Inc. Burns succeeds R. W. Krajicek, who has been transferred to Lake Charles, La.

Burns and Woolman recently completed an 8-week training program at Oakite's New York headquarters and in the field. Burns formerly was with Continental Oil Co. Woolman served several years at Cities Service Refinery Corp.'s Lake Charles plant.

Westinghouse Diodes Survive Texas Forest Fire



This Westinghouse Electric Corp.'s 25-amp. silicon diode was installed in a Branch-Krachy Co. oil-immersed cathodic protection rectifier, used to prevent galvanic action corrosion of oil pipelines near a Texas refinery. The rectifier was burned out in a forest fire, the 11-gage steel case badly warped and the oil burned, but three of these silicon diodes were found to still have their original operating characteristics.

So accurate it's the world's first choice!

No matter where in the world you go, Kilgore or Kuwait, you'll find oilmen swearing by the accuracy of the TOTCO double recorder. Not satisfied with one reading, the reliable TOTCO double recorder checks itself—with only *seconds* elapsing between first reading and check. That's why most oilmen the world over say, "Be sure you know, use TOTCO!"

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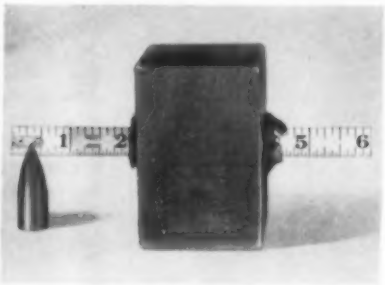


Illustration above shows a 2½" steel test sample pierced by an improved ½" Ogival Bullet fired by a McCullough M-3 Bullet Perforator.

McCullough Sectional Gun Gains Penetration Where Previous Attempt Failed

Depth of operation was only 1487' 4½" O.D. casing had been cemented in 10¾" hole. Pay zone was bullet perforated by another service company but the formation would not break down. During the attempt to fracture, the pipe split above the zone and collapsed in the perforations.

Operator swaged out the 4½" casing, ran a 3" liner inside the 4½" and cemented the annulus. This operation made an impressive amount of steel and cement to be penetrated to gain production.

McCullough shot 20 improved ⅜" Ogival Bullets in the zone and the formation broke down at 800 lbs. Time on the job was one hour. Results, a good well and a satisfied oil man.

McCullough Sectional Guns are available in 1⅛" O.D., 1¾" O.D. and 2¼" O.D. sizes.

Powerful M-3 Guns Increase Production 316%

Hard Shooting M-3 Guns, Firing Improved Ogival Bullets, Gain 38 B/D Over Previous Jet Perforating

An excellent example of the penetrating power of McCullough M-3 Bullet Guns was recently reported from a California oilfield.

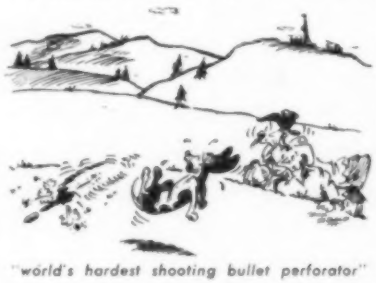
This was a shallow, low production field. The well had previously been perforated by another service company with shaped charges for a settled production of 12 barrels of oil per day.

Productive interval lay between 3837' and 3872' and was cased with special 7" O.D. 51 lb. casing. Casing was cemented in 9¾" hole through the pay zone.

Although skeptical of the ability of any bullet perforator to gain effective penetration through the extra heavy casing and thick cement sheath, the operator called for McCullough M-3 Bullet Guns.

McCullough Service Crew made three runs with 4¾" O.D., 20-shot M-3 Guns, firing 140 improved ½" Ogival Bullets, four per foot, in the 35' zone.

Production increased from 12 to a settled 50 barrels of oil per day—a gain of 38 barrels. The job required two hours, including rigging up and tearing down. To quote the operator, "Results were very satisfactory and gratifying".



"world's hardest shooting bullet perforator"

M-3 Penetrates Two Strings For a Good Well

Two strings of casing had been set through the pay zone at 5587'–5590'. 5" O.D. 18 lb. liner was cemented in 7⅝" O.D. 28 lb. casing which, in turn, was cemented in 11¼" open hole.

A 3½" O.D. McCullough M-3 Gun fired 18 improved ½" Ogival Bullets in the three foot pay zone. Operator stated he is satisfied it is his best completion to date.

Burr-Free Penetration

A new Burrless Bullet Cap, if desired, is inserted over the point of the improved Ogival Bullet at the time the M-3 Gun is loaded. It provides a completely burr-free hole on the inside surface of the perforated casing. Symmetrical, smooth holes make the use of ball sealers more effective in acidizing and sand fracturing—assuring more complete perforation shut-off.

Burr-free holes make casing scraping only a routine, precautionary measure and insure free passage of swabs, packers or other close fitting tools.

The jobs described above are certified to be true and accurate field reports of services rendered.

McCullough® *TOOL COMPANY*

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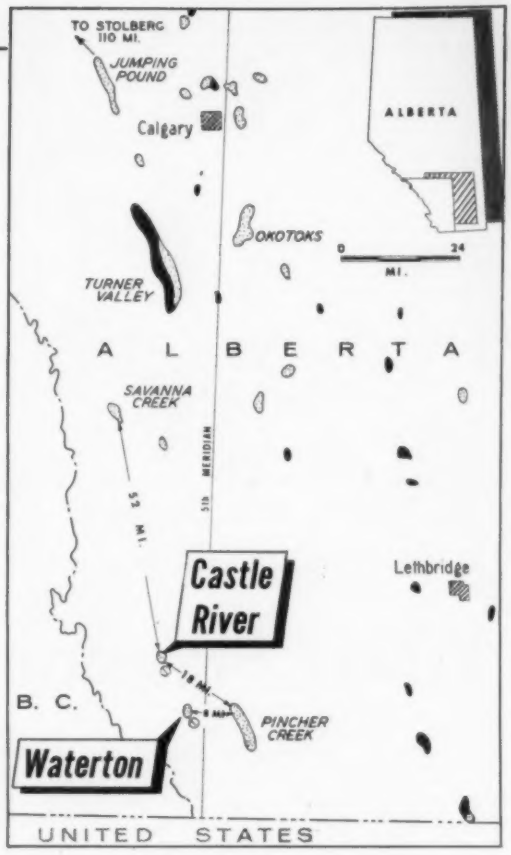
Canadian Geologists May Have the Last Laugh

By Frank J. Gardner

ELSEWHERE in this issue (page 191), you'll find an interesting paper by C. Warren Hunt on the oil and gas prospects of Alberta's mountain and foothill structures. Included in it are some fine photographs of surface structures there. Hunt is known to his friends as a "geologist on horseback," partly because of his favorite vehicle for mountain travel and partly because of his down-to-earth grasp of the basic fundamentals of mountain geology. He believes in the mountains and foothills as a future source of important oil and gas fields.



ALBERTA'S 300-mile mountain and foothills belt has already paid off with two major gas fields at Pincher Creek and Savanna Creek. Three new discoveries add even more luster to the trend.

Two big strikes . . . And that belief has recently been vindicated in two or three different places. The two most important of these are Waterton and Castle River, 8 and 18 miles, respectively, west of famed Pincher Creek gas field, Canada's largest. Important gas discoveries at both these places have been officially announced, and confirmation tests are now going down at each one. Both strikes are flowing from gross pay sections in excess of 750 ft. and both are from the Rundle-Mississippian, the same reservoir rock that is ready to pay off so handsomely at Pincher Creek (a 1.8-trillion-cubic-foot reserve) and at Savanna Creek (a 670-billion-foot reserve). There is some conjecture that the two may lie on the same huge uplift at opposite ends of the same field, but that is only wishful thinking at this point. The two confirmation tries may lend some credence to this possibility.

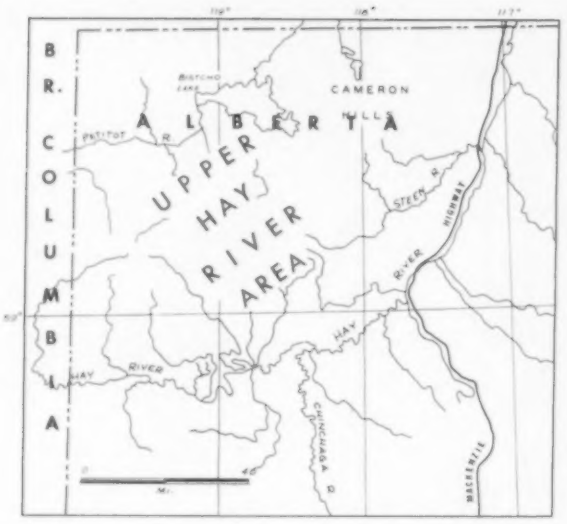
Texaco Exploration Co. discovered Castle River at its A-3-4 wildcat (LSD 3, Section 4-6n-2w5); this is part of a 11,396-acre block purchased by the company for a modest $68,288 in May 1956, on Reservation 141. With ground elevation of 4,349 ft. (kelly bushing 4,363 ft.), the discovery topped the Rundle at 11,067 ft. and was still in the formation at total depth 12,060 ft. It had found no water line. Operators plugged back to 11,310 and set production pipe. Later testing produced an estimated potential of 40 million cubic feet per day open, and a restricted flow of at least 12 million.

Shell Oil Co. found the Waterton reservoir at its 1 Waterton (LSD 4, Section 21-4n-1w5). Here, the bit reached to 14,045 ft. before the operator plugged back to 12,110 ft. for initial testing last March. On a 10-day open-hole test of the gross 778-ft. Rundle interval 11,332-12,110 ft., Shell reported a potential of 6 million cubic feet per day on 20/64-in. choke plus 30 bbl. of condensate per million. Kelly elevation was 5,107 ft.

May mean a third major field . . . Now, both Texaco and Shell are drilling confirmation wells southeast of the two strikes. Texaco A-6-15 Gladstone Creek (LSD 6, Section 15-5n-2w5) is at the 7,000-ft. mark, about 4 miles southeast of the Castle River strike. Shell 2 Waterton (LSD 7, Section 2-4n-1w5) is near the 2,000-ft. level; this test is also about 4 miles southeast of the original discovery well. If either of these should hit, new evidence of a major gas field to rival Pincher Creek and Savanna Creek would be at hand. If both hit, it's a cinch.

Here are two accents to the growing interest in foothills and mountain fields. A third has recently been found at Stolberg, 250 miles northwest of the Castle River-Waterton area. Here, Triad Oil Co., Ltd., and British American Oil Co., Ltd., have again punctured the Rundle gas reservoir at its northernmost foothills point. Their 6-10A Stolberg (LSD 6, Section 10-42n-15w5) flowed 8½ million cubic feet of gas per day from 11,425-11,606 ft. on a 5-hour test. Operators carried this one to 11,867 ft. and plugged back to 11,606 ft. for the test. Ground elevation was 4,810 ft.

And a geological victory . . . This entire 300-mile foothills belt should resound to wildcatting activity over the next few months; it's a region of complex geology, but Canadian geologists on horseback are making great strides in subsurface interpretation, and great gas fields like Pincher Creek, Savanna Creek, and Castle River are a tribute to their progress. In his paper, Hunt tells us that "in spite of the odd snicker from those who suspected it was all a mistake, some prospects in the mountains are today being drilled. These prospects are currently valued highly and seem to promise important discoveries." The odd snicker, Mr. Hunt, will grow into a horselaugh for you and the other equestrian rockhounds.



In Alberta's northernmost reaches, oil search must beat the "breakup." Here's . . .

Where Prospecting Has a Deadline

Working conditions are rugged, but aggressive approach will be rewarded

By E. G. Haines

THE Upper Hay River area lies in the northernmost portion of Alberta, Canada, about 300 miles north of the town of Peace River, in a vast region of heavy timber and muskeg. Access to it is provided by the MacKenzie Highway, running north from Grimshaw, which is approximately 500 road miles north of Calgary. It lies north and west of Upper Hay River Post and is a massive topographical feature formed by glacial material varying in depth from 10 ft. on the lowermost flanks to 1,500 ft. where the surface elevation is highest. The severe drilling conditions and accompanying problems of seismogram quality dictate that the bulk of exploration work must be done during December, January, February, and March, when the muskeg is frozen.

Moving in . . . By late November, bulldozers, camps, and all necessary equipment such as light plants and storage tanks are ready for the move, usually from Peace River town. The area is thoroughly studied from the air and the access road planned from aerial photographs. Bulldozing equipment is moved from Peace River town, up the MacKenzie Highway to the prospect area. Usually, two bulldozers are used per crew and the bulldozers work 22 hours a day; the other 2 hours are used for servicing the equipment. Access roads are usually planned to utilize the higher topographical features so that these roads will stand up better under early spring run-off conditions. In areas where the topographical relief is severe, small creek drainages are filled in as the bulldozers proceed.

Camp and supplies . . . When the access road is completed to the campsite, the camp is moved in. In the late forties, camps were primitive, usually constructed on skids and were hauled in by bulldozers.

However, today's camps are modern and bright and are usually on wheels. They consist of four and six-man sleeper units, with double bunks, and lockers and personal storage provided for each man. Light and power are supplied by gasoline or diesel-operated light plants; an emergency light plant is provided on a standby basis. Camp units are heated with diesel-fuel stoves which have a built-in electric circulating fan to maintain a uniform temperature from the floor to the ceiling.

In early camps, persons in upper bunks could hardly sleep because it was too hot, while those in the lower bunks would be shivering; ice has formed under the lower bunks.

Two of the most important units in any camp are the utility trailer and the cook shack. Today, the utility trailers have sinks, showers, laundry facilities, and toilets run from an efficient pressure system. The cook shacks, probably the most important single item in camp, are equipped with propane stoves and refrigerators. Supplies and mail are hauled weekly from Peace River town and consist of gasoline, propane, diesel fuel, and the best quality food that can be bought. A crew of 25 men working a 10-hour day, in extreme subzero temperature, develop tremendous appetites. But they get good food and lots of it.

Modern up-to-date camps have a recreation trailer where the men can relax after hours, reading, playing cards, listening to records, or watching movies. A portable garage also is supplied, which is large enough to house a shot-hole drill. Here the crew mechanic, working in the evenings, maintains all equipment and

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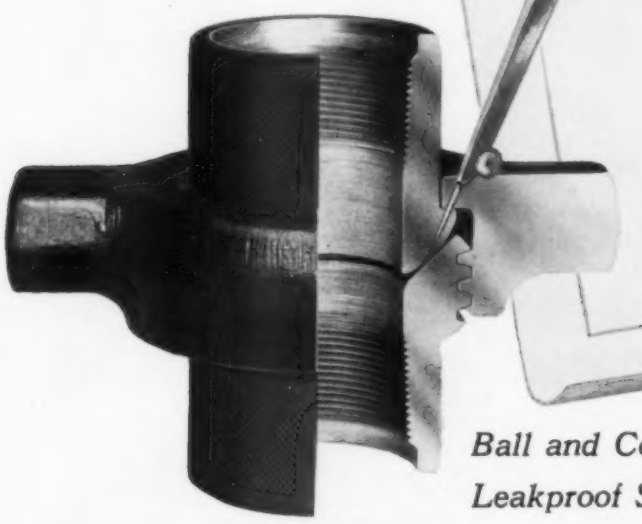

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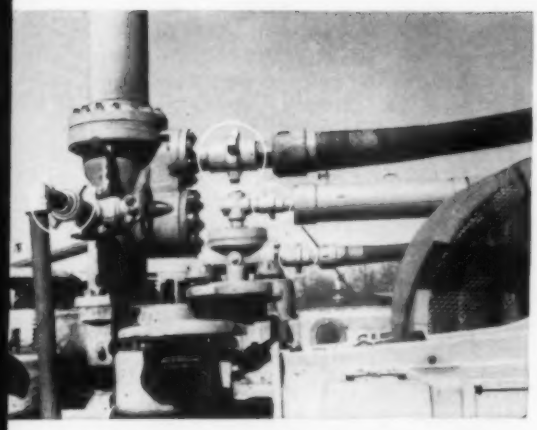

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THE AUTHOR

E. G. Haines is chief geophysicist for Canadian Seaboard Oil Co. He was graduated from the University of Manitoba in 1941 with a Bachelor of Science degree. Prior to joining Seaboard in 1950, he was employed as a geophysicist by Imperial Oil, Ltd., and Beaver Geophysical Services, Ltd.

rebuilds drilling bits. Emergency supply hauls, usually for critical equipment parts are accomplished with light aircraft. For this reason, and since supervision is made easier by aircraft, the camps are usually located near a lake that offers good landing facilities. Airstrips are equipped with wind socks and have cut pine trees dotted along the edges; these enhance the pilot's perspective on days when there is no sun, and consequently no shadow.

Communications are important . . . One of the biggest obstacles in efficiently working the bush country is lack of adequate communications. These have improved over the past 10 years from Peace River to Calgary or Edmonton and should be excellent in coming years, since microwave equipment is now being installed. However, from Peace River north, 60 per cent reliability is considered good and is achieved through the use of medium and high frequency short wave radio. Using this setup requires dilligent selection of type of set, antenna, installation of set and antenna, and service requirements.

Sun-spot activity is responsible for most poor receptive periods, when a camp crew cannot receive the base station 200 miles away. Paradoxically, due to thermal inversion, the Los Angeles police or Seattle's ship-to-shore phones will come in loud and clear. Very high frequency has been attempted but due to high path loss because of rugged terrain, this can be expensive. Most companies are presently obtaining fair results from critical installation of medium and high frequency facilities.

Getting the Job Done

Working conditions in northern areas can be very arduous because of extremely rough terrain and temperatures in —50° F. range. Also early snowfalls can contribute hazardous conditions. A snowfall coming before freezeup will settle in the deep timber and will not melt because it is shaded from the direct sunlight. Then when freezeup comes, the blanket of snow acts as an efficient insulator and the muskeg does not freeze. When this occurs, it is not uncommon to see a bulldozer fully submerged in water even though it has been —30° to —40° F. for several days. However, two bulldozers working as a team, supervised by the party manager and surveyor, can cut approximately 3 miles a day in heavy timber, including cleaning out shot points so that the shot-hole drill can locate the holes off the road.

Shot-hole drilling in most bush operations involves much hardship, since the driller and helper are working around water most of the time at subzero temperatures. Water trucks are constructed with an opening in the center of the tank in which wood fires are kept burning constantly to prevent the lines from freezing. Without the fire, ice gradually builds up inside the tank until it becomes inoperative. Extra water trucks are a valuable asset in northern operations, for in many areas there is a long water haul over bulldozed trails upon which trucks can average barely 10 miles per hour.

The advent of the auger type of drill has been a boon to bush type of operations where the drilling is good and the water haul long. Even in the Upper Hay River area where the drilling conditions are extremely rough, an auger can be used to drill the good locations, leaving the rough drilling to the heavier drills. At Upper Hay River, the drilling varies from thick deposits of pea gravel and sand to clay and rocks. In many locations, it is impossible to drill deep enough holes and in these cases, pattern holes are drilled.

In addition to pattern holes, multiple phones in varying numbers are used by the recording crew. This is a standard procedure in the Upper Hay River area where three, five, or seven holes are used in conjunction with 9 or 18 phone strings of multiple seismometers. Unfortunately, because the crew is restricted to the bulldozed trails, holes and phones can only be arranged in "in line" patterns but this technique has produced usable data in what were previously considered no-record areas.

Advances in instrumentation such as magnetic tape or disk recording have had a lot of impact on northern bush operations. By recording an unfiltered record on tape or disk, the operator can refilter, composite, or make record cross-sections during the summer months when the area is virtually impassable. The observer on the crew also produces a filtered record on every shot point, which the party chief and computers use to make the current interpretation in the camp office. The use of magnetic tape or disks in the bush country presents some interesting problems, mainly due to adverse temperature conditions. The voltage drop between power supply and recording heads is considerable and if great care is not exercised in keeping all batteries charged, the resulting trouble can be extremely hectic.

"One of the biggest obstacles in efficiently working the bush country is lack of adequate communications. These have improved over the past 10 years and should be excellent in coming years."

In remote areas where subsurface control is sparse, the onus is on the geophysicist to produce top quality data which can be coordinated to known geology. A seismic crew working out of a bush camp soon becomes a compact entity since they literally work, eat, and sleep together. It is this close relationship that produces the excellent results required. Visits from the crew supervisor provide added technical advice and help to maintain morale at a high level. The morale of the bush crews is excellent in view of the long hours of work.

Most crews work 20 days straight and take 10 days off. In Upper Hay River, however, the personnel are rotated, and equipment can be worked 30 days per month. Current interpretation on the crew is vital since likely looking anomalies should be fully evaluated as rapidly as possible in order to provide drilling locations for the following winter.

Toward the end of March, the weather changes abruptly and the main topic of conversation throughout northern Alberta is spring "breakup." Seismic crews work as late as they can but bulldozed trails become impassable after several warm days and nights. At this time the crew, camp, and bulldozers are moved out as a unit.

Although working conditions are difficult, experience gained over the past 10 years has enabled the exploration geophysicist and geologist to explore the northern bush country with confidence and enthusiasm. This aggressive approach should and will pay off in increased petroleum reserves. **End.**

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AGRICULTURE AND OIL have enriched the Alberta prairies but millions of acres still lie untested by the drill.

The author predicts . . .

1. In the near future the industry will be faced with a 10-year lease with somewhat higher royalty and more stringent work obligations.

2. By about 1962, there will be some 75,000,000 acres of Crown reserve lands—in other words, roughly 40 per cent of all lands in Alberta.

3. To get more of its Crown reserve acres in circulation, the Government will have to increase the size of acreage blocks put up for tender in the form of drilling reservations, gas permits, etc.

4. The Government will devise some new type of permit or license, something that might be called an exploratory permit. This permit could cover a good sized block of acreage, say 20,000 acres, and would carry with it an obligation to do certain geophysical work and drilling. The term of the permit would be for say 18 months or so, the idea being to keep acreage turning over.

5. The big freehold owners will continue to tighten their terms both as to work and price per acre and shorten the term of their agreements.

6. The huge acreage inventories of many companies will be drastically cut because of the conversion of reservation to lease and shorter lease terms, etc. This will mean that today's company acreage inventories of 8,000,000 acres or more, by 1962 or so, will be more in the order of 1,000,000 acres or less.

Availability of Leases Tightens In Alberta Development

By A. G. Bailey

IN 1944-45 Crown Reservations of 200,000 acres were available almost anywhere in Alberta. The work obligations were very easy and there was no great rush to put big blocks together. The Crown is the main landlord in Alberta; the remainder of the lands are owned by companies such as Canadian Pacific Railway, Hudson's Bay Co., and others. These companies received their lands by government grants many years ago.

Only in the case of individual holdings or freehold leases has the manner of land acquisition by oil companies been similar to that in the United States, where the 10-year lease with a one-eighth royalty is commonly accepted and the operating company must deal with large numbers of owners of small parcels of land to assemble a decent sized drilling block. Even in dealing with freehold leases in Alberta, the operator is not faced with the same difficulties involved as in an American land play, because the average Alberta freehold lease covers at least a quarter-section. In many areas in the United States, the land has been divided into much smaller tracts.

Pooling and unitizing . . . This will turn out to be an even greater benefit to the industry in the future because, as development continues, the need for pooling and unitizing will increase greatly. These arrangements are much more easily accomplished here than they would be if the preponderance of rights were held by large numbers of small owners.

It was very interesting to watch the various companies come in, look around, talk to everyone, and then either open up their offices or go back home to wait a year or two. Gradually, more and more operators moved in to stay.

One of the first items in company operations noticed in the early stages was that there appeared to be two distinct types of land acquisition policy: (1) the majority of the companies tended to go for Crown reservations with perhaps some CPR lands; (2) some of the other companies went after large spreads of freehold and Crown leases (not reservations) scat-

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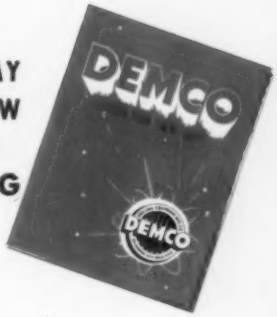


DRILLING EQUIPMENT

tered over the entire southern half of the province. Both of these approaches have certain advantages. Most major companies use both policies.

It was also quite apparent, as the companies began acquiring acreage faster, that this acreage was not acquired for purely geological reasons but rather to keep in on a play. Many operators adopted the policy of buying first and looking second. As a result, the geologist has often had to be concerned not so much with looking for likely places to buy leases but rather with studying land already acquired at the urging of some eager landman.

Another item of importance began to be somewhat apparent after only a few years: companies with some imaginative thinking started or foresaw trends in acreage acquisition and got into such plays before all the desirable lands had been taken. The sense or ability to foresee such trends has been a big factor in giving some companies excellent land spreads today.

As an example, about 1944, the oil-producing potential of Alberta was generally regarded as being restricted to the Mississippian in the foothills and to the Lower Cretaceous in the plains. At that time, the play was concentrated around Turner Valley and along a very limited foothills front, in the Princess area, and in the Vermilion-Lloydminster areas. Some of the larger companies and a few independents acquired reservations to broaden the Princess play; another new play started in the Conrad-Taber area. This was a small land play by today's standards but it showed that if a new trend or play started, the companies who could foresee it first or acted fastest got the best acreage.

Shortly after this, another trend started in the Viking-Kinsella-Edmonton area. Here again, the early comers did best, with other slow operators picking up large blocks, not for geological reasons, but simply for straight protection reasons.

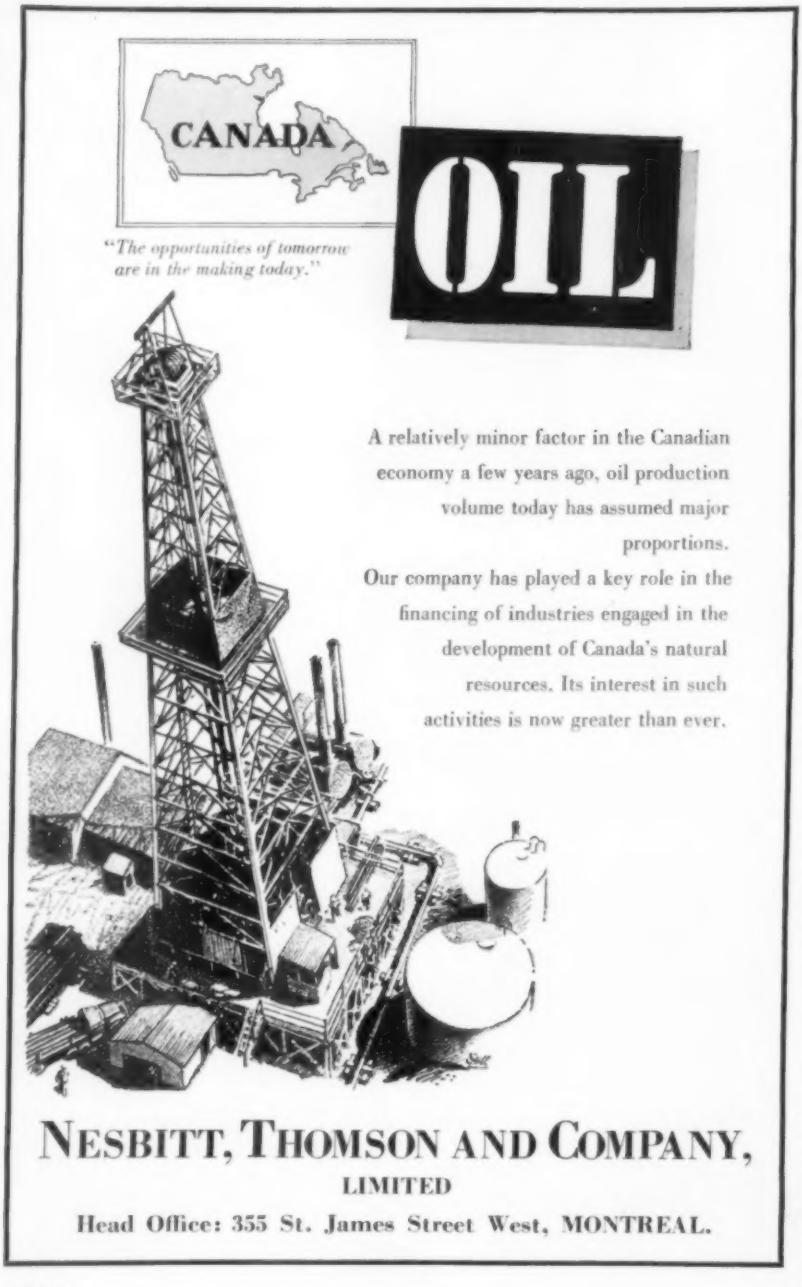
Leduc . . . Then came the big blow that launched the hottest trend of all —**Leduc.** This touched off the now-famous land grab in the Central Plains, sometimes called the Golden Fairway. Shortly before Leduc the Alberta Government sent a delegation to England in an effort to interest British capital in developing our oil and gas resources. This group offered to lease the British vast amounts of acreage at nominal rentals, and were turned down. In fact, just before Leduc there was serious talk by well qualified people that the future of the industry hinged on our gas resources and that the use of processes such as Hydrocol would be our salvation. Very serious consideration was being given to the problem but Leduc solved it.

For some time after Leduc, most of the companies concentrated their efforts in the fairway with notable success.

However, after a few years two new trends started almost simultaneously. One was back to the foothills and a new one pointed to northwestern Alberta. Here again, companies with imagination gained a preferred position.

We have just recently completed the last and probably the biggest trend; this was the Granite Wash play in northern Alberta where millions of acres were taken up in a matter of a few months in 1956.

Acreage acquisition . . . During the past 10 years particularly, it would appear the landman's view has outweighed that of the geologist in the acquisition of acreage. However, I believe we are now entering a period in which the landman's job will tend more to the putting together of blocks for drilling purposes or unitization than to acquiring large blocks on a purely speculative basis; this land probably will be acquired almost en-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tirely on the recommendation of the geologist.

Naturally, the Government has followed the play with as great interest and concern as the industry. As the tempo and interest increased, the Government revised and adjusted its policies. Crown reservations were reduced from 200,000 to 100,000 acres. The work obligations were increased and more closely followed up. About this time a great howl went up that the Government, by allowing companies to take up several 100,000-acre reservations each, was selling our heritage down the drain. However, the Government stuck to its guns and the industry was encouraged.

We still have the same basic landlord but the value and method of dealing and disposing of these lands hsa changed drastically in 10 years. He can no longer leave lands open for normal reservation plays, but must put them up for tender as leases, drilling reservations, etc.

The Government does not want to sit with millions of acres of Crown lands not being actively explored. Those companies who had a policy allowing them to acquire large spreads of reservations, especially in advance of trends, now stand to benefit very handsomely. Because they have (or will have as their reservations lapse) a big checkerboard of sizable lease blocks which form the backbone of a company's ability to stay in the business.

Now we will anticipate a new type of trend: "What will the Government's thinking be with regard to the disposition of its Crown reserve acreage?" To give some idea of what has happened to the Crown lands, in 1947 there were just over 12,000,000 acres of Crown-issued reservations and leases. By comparison, at the end of 1956, there were 76,000,000 acres of reservation, lease, gas permits, drilling reserves, etc., issued and about 35,000,000 acres of Crown reserve had been created.

It has been Government policy to put up Crown reserves, drilling reservations, gas permits, etc., for tender. This has been a good policy, and the Government must stick to uniform application of acts and regulations. In other words, it cannot make special deals with selected operators. However, it is very obvious that the chips are getting bigger and probably will get bigger still. For this reason, many of the independents have had to merge and there will be many more such mergers if they are to survive. I cannot conceive of any policy which the Government could adopt that would give the independent an edge over his bigger competitor. I do suggest that somewhere along the line something will have to be done if he is going to survive.

Conclusion

The Alberta Government has always cooperated to the utmost with the oil industry. On the other hand, the industry has fulfilled its obligations and duties. The result has been a most harmonious situation in which a young industry has been able to grow and to plan for the future. **End.**

THE AUTHOR

A. G. Bailey is a director of Trident Drilling Co. Ltd., Alberta Gas Trunk Line Ltd., Transair Limited, and Canadian Petroleum Association.

He was educated in Ottawa and McGill University, and came to Calgary in 1944 to become Deputy Chairman of the Alberta Petroleum and Natural Gas Conservation Board. From 1945 to 1947 he served as chairman of the board and in 1947 joined Husky Oil & Refining Limited as manager of land and exploration. In 1949, he formed A. G. Bailey Co., Ltd., and he now holds the position of vice president and general manager of Bailey Selburn Oil & Gas, Ltd.

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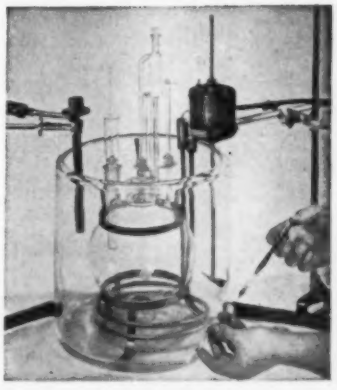

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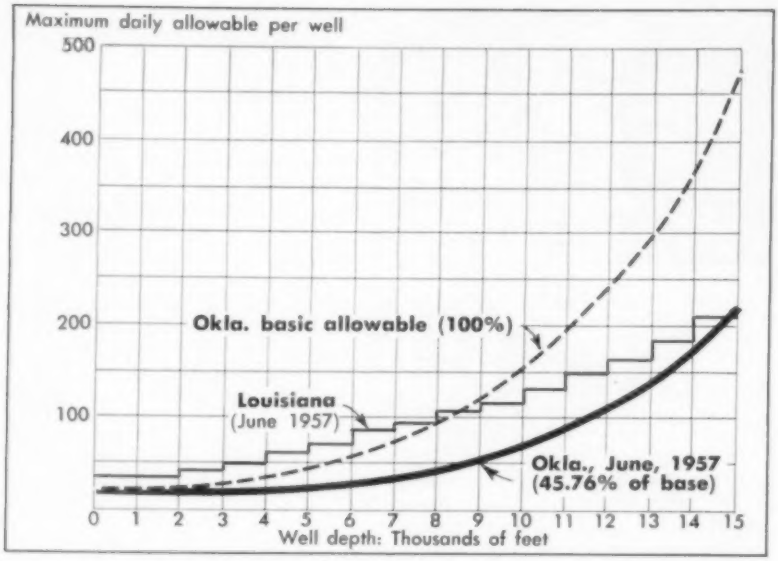

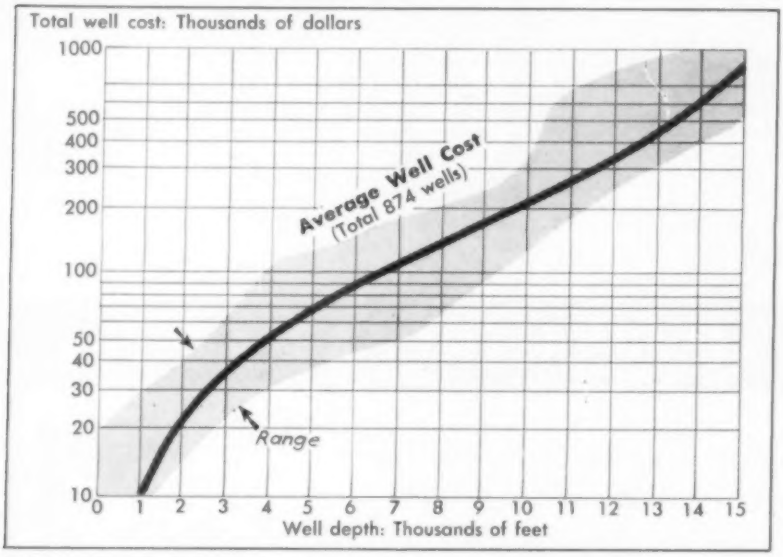

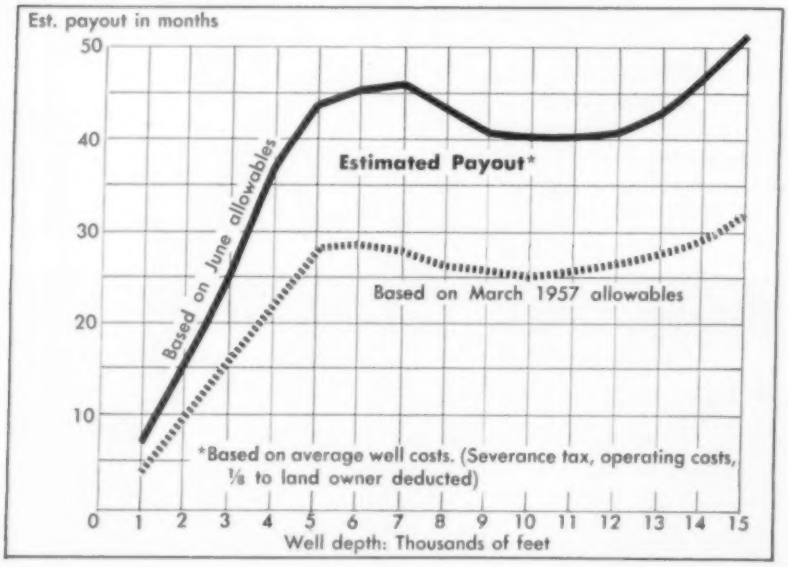
Est. payout in months
50
40
30
20
10
Estimated Payout*
Based on June allowables
Based on March 1957 allowables
*Based on average well costs. (Severance tax, operating costs, ⅛ to land owner deducted)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Well depth: Thousands of feet

Oklahoma Production Sees Cut Back

WITH the easing of the Suez situation, and the increasing imports, the Oklahoma Corporation Commission has cut back the daily production in the allocated or prorated fields to 45.76 per cent of the basic formula. A glance at the graph shows how the present Oklahoma allowables compare with both the basic allowable schedule and with Louisiana's allowables. It is immediately apparent that the daily production per well from a given depth in Oklahoma is considerably under that in Louisiana except for deep production below 15,000 ft. For example, an 8,500-ft. well in Oklahoma has a maximum allowable of 50 bbl. compared with Louisiana's 103. And this spread in daily allowables makes for much longer payout periods in Oklahoma.

What Do Oklahoma Wells Cost?

THE Oklahoma Corporation Commission recently conducted a study of the costs of completed oil wells in the state. The graph shows the range of costs and an average-well-cost curve based on a study of 874 wells. For example, completed 5,000-ft. wells range in cost from a low of $38,000 to a high of $140,000. An average well in this class costs $70,000.

The Corporation Commission stated that well costs in Oklahoma are comparable to well costs in other oil states for the same depth brackets. The results are in line with other similar studies and show the extremely rapid rise in well costs below 8,000 ft.

How Long Is the Oklahoma Payout Period?

THE original study of the Corporation Commission was based on Oklahoma's March allowables when the allocated areas were producing at 71.5 per cent of the basic allowable schedule. Then estimated payouts were under 30 months for the majority of wells, using average well costs from the graph above. Since then, however, the picture has changed radically because of the reduced allowables. In March, the estimated payout on a 5,000-ft. well was only 28 months. But in June the estimated payout time jumped to 44 months, increasing the payout period by 57 per cent. These payout estimates do not allow for normal profit, overhead, overrides, oil payments, trucking charges, etc.

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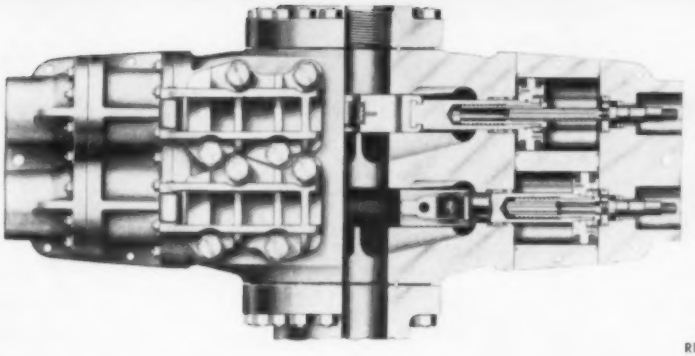

CUTAWAY VIEW
Showing direct hydraulic drive and self-draining ram compartments.

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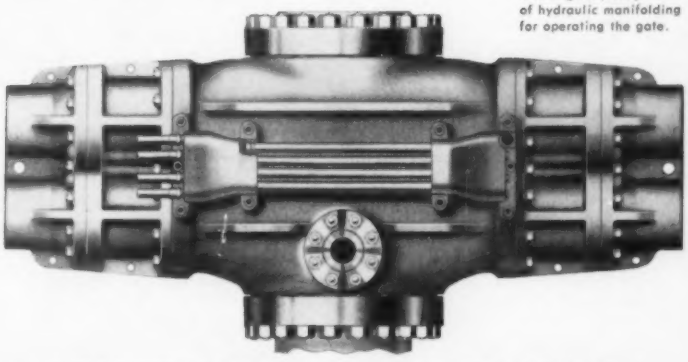

REAR VIEW
Showing simplicity of hydraulic manifolding for operating the gate.

SOUNDS ACADEMIC

– and maybe it is. But the point we make is this: — Feature by feature, no other cellar control gate incorporates so many advanced features as do SHAFFER *Gates. So why settle for less when you can get all of these unique advancements by specifying* SHAFFER*?*

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Rams must be changed frequently to fit varying pipe sizes as wells are drilled. With Shaffer Hydraulic Gates there is no need to dismantle the unit to change rams. You simply unbolt patented *side-opening* doors . . . swing them open . . . change rams . . . and bolt the doors shut again. Closing the doors automatically aligns the rams within the gate. And complete ram changes can be made with equal convenience whether the pipe is in the hole—or out!

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For simplified inventory and maintenance, you can standardize on Shaffer Gates—yet maintain maximum versatility to meet varying field requirements. Shaffer provides a choice of either Single or Double Hydraulic Gates with the same unique design and operating advantages. Also, in each type you have a choice of *Rising* Locking Shafts (where quick indication of ram position is desired) or *Non-Rising* Locking Shafts (where maximum compactness is desired). Rams and most other parts are interchangeable, size for size!

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Cellar equipment that is bulky can take a high toll in greater rig costs, larger cellars, clumsy hook-ups. But Shaffer Gates are unusually compact in *all three* dimensions—height, width, and length. Furthermore, no extra space need be allowed above gate—or at ends—for servicing rams. **Result**—even in sizes as large as 13⅝" (12" Series 900) the Double Gate has a *total* height of only 30" . . . the Single Gate only 18½". *No extra space need be allowed above or at the ends for ram changes.*

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EXPLORATION HIGHLIGHTS

APPALACHIAN

OHIO

McCall Extends Walhonding Area Pool

McCall Drilling Co. extended the pool northeast of Walhonding ⅓ mile by their 2 W. Marlatt, Lot 16, New Castle Township, Coshocton County. Clinton sand was found at 3,227-84 ft. with a fair showing natural and 95 bbl. in a 24-hour test after fracture.

● Wiser Oil Co. moved over into Union Township, Knox County, and brought in their 1 (3) Ida Sevitts, Lot 5. Clinton at 2,835-62 ft. gaged 15 bbl. natural and 105 bbl. in 24 hours after fracture.

● Kewanee Oil Co., plugged their rank wildcat on E. A. Hopkins, Union Township, Fayette County, at 4,708 ft. (in granite) and started another in Concord Township on Esther Wilson, southwest of Washington Court House.

WEST VIRGINIA

Rank Wildcat Slated For Pendleton County

Hope Natural Gas Co. will drill a rank wildcat in the Circleville district of Pendleton County. The well will be the 10093 U.S.A. Department of Interior. Location is on the Spruce Knox Quadrangle, 4.30 miles south of latitude 38 degrees 45 minutes and 0.48 mile west of longitude 79 degrees 35 minutes.

Large Gas Flow Reported At Logan Well

United Fuel Gas Co. 8531 fee, Chapmansville district, Logan County, flowed 11,204 M.c.f. of gas and 1,275 psi. in 12 hours on final open flow after acid treatment of the Big Lime. Total depth is 1,614 ft.

EASTERN KENTUCKY

Leslie County Wildcat Reaches Total Depth

United Fuel Gas Co. have reached total depth on their rank wildcat 28 Fordson Coal Co. located on Left Fork of Elkhorn Creek in Leslie County and northeast of town of Sizerock. Test was drilled to 6,006 ft. or 1,000 ft. in the Knox dolomite topped at 5,006 ft. (corrected). Numerous showings of oil and gas were had in the strata penetrated and operator plans to test some of them. Besides the Knox, other important tops are: Mississippian Big lime 1,630 ft., Devonian brown shale 2,202 ft., Corniferous lime 2,425 ft. and Clinton sand 3,016 ft.

Southern Alberta offers 9,000 ft. of sediments with numerous pay zones. Kenneth E. Worral (left) and Martin W. Schramm (right) with Alex McCoy Associates, Tulsa, study the many Canadian pay zones in this exhibit prepared by Worrall during the detailed analysis of southern Alberta's oil and gas potential. For a full report on Canadian pay zones, see the Journal's new Stratilog of Canadian oil formations in this issue.

EXPLORATION THIS WEEK

Appalachian	300
Canada	300
Louisiana	301
Michigan	301
Nevada	303
New Mexico	303
Oregon	304
Rocky Mountains	304
Oklahoma	305
Texas	306

CANADA

SASKATCHEWAN

Canso Hits at Viking Test Near Hoosier

Canso Oil Producers, Ltd., a company that shared in the first indicated light gravity oil discovery in southwestern Saskatchewan back in March of 1952, today announced that another exploratory test in the same general area has assured its commercial oil success by flowing that product from the Viking sand at the rate of 381 bbl. per day through a ¼-in. choke. The company's new wholly owned discovery, Canso 11-28 Hoosier was drilled on LSD 11, 28-31-27w3. It lies 8 miles west of Smiley-Dewar oil field, 2 miles north of the recently established Hoosier Gas Unit and 2½ miles north of the Canso 8-16 Hoosier wildcat abandonment.

The original discovery in which Canso had a stake, Canada Southern Albercan 4 Driver was not completed as a commercial Viking sand oil well but did give very encouraging oil shows in the section and sparked exploration in the area which resulted in the discovery and development of Smiley-Dewar oil field. That field is presently the largest light gravity oil producing area in southwestern Saskatchewan. Officials of Canso stated that further exploration work and actual production testing of this discovery will be necessary before full value of the new find can be determined.

The well was drilled on a lease tract which is part of the company's very large spread of leases withdrawn from its original Saskatchewan permits Nos. 50 and 63. Currently the firm has a net interest in 130,000 acres in the general region of the find.

The Viking sand was topped around the 2,330-ft. mark and drill-stem was run of a 33 ft. interval, bottomed at 2,400 ft. Gravity of the oil graded at 36.2°.

LOUISIANA

SOUTH LOUISIANA

Production Spreads In Bayou Penchant Area

California Co. has completed another good well in Bayou Penchant, In Terrebonne Parish's coastal marsh area. Potential flow through ⅝-in. choke was at the rate of 390 bbl. of 45.2°-gravity condensate and 6,773,000 cu. ft. of gas per day.

The well, 1 La Terre, was drilled to 14,800 ft. Pay is perforated at 13,630-70 ft. This is the deepest production in the field so far. Flowing pressure, through the ⅝-in. choke was 4,750 psi.

Bayou Penchant was discovered in 1944. First test was drilled by The Texas Co., although first production was by Superior Oil Co. Humble Oil & Refining Co. also has production in the area. The new well is the first by California Co.

Second Well Confirms Discovery at Lawtell

Arkansas Fuel Oil Co. is confirming a gas-condensate discovery made by Olin Oil & Gas Co. last November in southwestern St. Landry Parish.

Its confirmation well, 1 Broussard, in what has been designated as Lawtell field, flowed at the rate of 4,060,000 cu. ft. of gas daily through ¼-in. choke while testing the discovery well's pay, perforated at 9,372-83 ft. Liquid (61°-gravity condensate) recovery was not gaged. Flowing pressure was 2,980 psi.

Olin's discovery well, perforated at 9,380-84 ft., flowed 1,550,000 cu. ft. of gas and 45 bbl. of condensate per day through 5/32-in. choke.

The area is about 5 miles south of Opelousas, and about 2 miles north of Lewisburg field.

LOUISIANA OFFSHORE

Offshore Well Uncovers New Caillou Island Pay

The Texas Co. is opening another gas-productive reservoir in its new extension area in the Gulf of Mexico off the south flank of Caillou Island dome, Terrebonne Parish.

The new well, the second on State Lease 2986, in South Timbalier area, flowed dry gas at the rate of 5,529,000 cu. ft. per day during tests through S-45 choke. Its pressure was 4,200 psi.

The reservoir is perforated at 12,240-65 ft.

The offshore extension area was opened last March. The initial well was oil-productive from a 14,670-ft. sand.

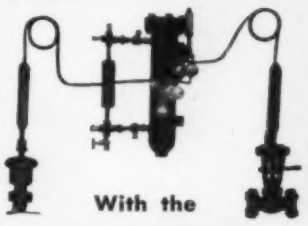
MICHIGAN

Clare County Wildcat Flows Marshall Gas

A Marshall gas pay that showed for 2,256,000 cu. ft. of gas a day on a 1½-hour drill-stem test was logged at W. L. Harvey 1 Kirkpatrick et al, SE SE NE 1-18n-5w, Lincoln Township, Clare County. Top of Marshall was logged at 1,807 ft. with pay showing from the top to 1,818 ft. Gas showed to the surface in 3 minutes on test run between 1,790-1,818 ft. In 10 minutes gas flow was gaged at 1,800,000 cu. ft.; in 1 hour at 2,100,000 cu. ft. with top gas reported at the end of the tests.

While there have been other gas well completions in area, closest (now plugged) ¾-mile south, this is the first Marshall sand gas showing well in the district. Other completions were in the Michigan Stray sand. Wildcat was cased with 7-in. at 2,024 ft. in preparation for deepening with cable tools to the Dundee at about 4,400 ft. Most observers believe that this well will, at the least, lead to the development of a Marshall sand gas field in the area. Harvey controls a drilling block of approximately 2,000 acres surrounding this wildcat which was farmed by him

STOP ACCIDENTS



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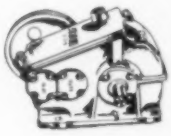

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NEVADA

Standard Redrilling White River Test

Standard Oil Co. of California was drilling ahead below 3,056 ft. on 1 County Line in the White River Valley of White Pine County. The operator was unable to recover a fish at 2,729 ft. and sidetracked the hole for the redrill now going on.

• Also in White River Valley, but about 13 miles northwest of Standard's test, West End Opoteca Mines Co. and Janoil Corp. were drilling in hard blue lime at 535 ft. on 28-1 USL.

• On the other active project in Nevada, J. O. Blalock was drilling below 2,183 ft. on 1 Orewitz in the Battle Mountain region of Lander County in the north central part of the state.

NEW MEXICO

Oil and Gas Fields of Southeast New Mexico

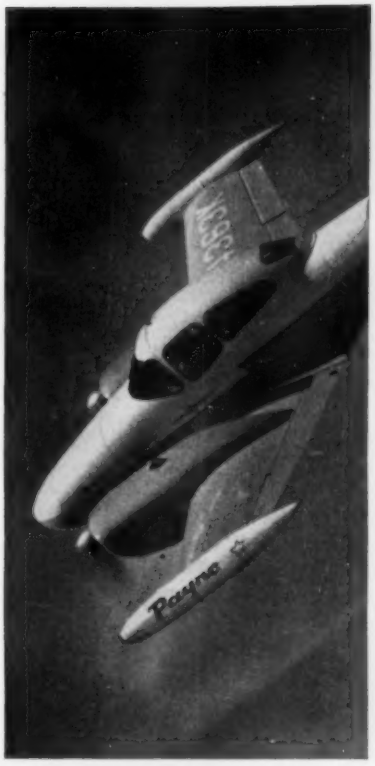
A symposium of the oil and gas fields of Southeastern New Mexico, covering data through 1956, has been published by the Roswell Geological Society. Copies may be ordered from the society at P. O. Box 6732, Roswell.

The 375-page book is a distinct service to the industry in bringing up to date all fundamentals concerning known oil fields in southeastern New Mexico.

Data on all fields is very complete. Maps are up to date as of May 1, 1956. Where practical, structure contours are shown on pay zones. Where multiple pays exist, a data sheet is included for each pay zone and only one map is included if the subsurface structure is approximately the same in each pay zone. When marked changes in the subsurface oil trap are present, as between the Wolfcamp and Devonian, two maps are shown.

The book contains north-south and east-west correlations, covering Southeast New Mexico and a part of West Texas; structural maps, with geologic history and discussion of the area's major structural features.

Highlights of exploration in southeastern New Mexico is also a feature, with events in chronological order. Discoveries are listed with initial potentials, operator, date of discovery, depth and formation.



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OREGON

GP Drilling Ahead At Sulphur Springs

General Petroleum Corp. was drilling ahead below 5,079 ft. on 1 Long Bell, a wildcat in the Sulphur Springs-Siuslaw area of Douglas County.

ROCKY MOUNTAINS

WESTERN NEBRASKA

Pan American Reports "J" Sand Banner Discovery

Pan American Petroleum Corp. has recovered oil from a wildcat well in the Denver-Julesburg basin area of western Nebraska.

The 1 Pan American J. R. Cross B, located in 28-19n-56w, Banner County, recovered 2,040 ft. of oil and 300 ft. of muddy water on a drill-stem test. Recovery was from the interval 6,161-67 ft. from the "J" sand, topped at 6,160 ft., with tool open 1 hour and shut in 20 minutes.

The 1 J. R. Cross B is located about 2 miles northwest of Downer field, which is the nearest production. The town of Harrisburg is 3 miles to the southeast of the well.

Pan American has full interest in the well and in about 2,400 acres near the drillsite.

MONTANA

Second Extension at Outlook Recovers Oil

Silurian oil was recovered on test at Amerada Petroleum Corp.'s 1 Norager, W½ SW SW 21-36n-53e, Sheridan County. This northeastern Montana well is the second well to promise extension to Outlook field.

The northwest extension to the field was completed a few weeks ago for 316 bbl. per day from Silurian. No other details are available on the 1 Norager extension.

Drilling continues in the Red River-Ordovician at 1 Patchin, SW SE 35-36n-52e, with the drill below 7,700 ft. The Patchin is southeast of the 1 Loucks, southwest of Outlook field proper. Another well, far to the northwest in C NE NW 20-37n-52e, is drilling at 8,000 ft. It is the 1 Grinker, and is northwest of a recent dry hole in Section 21.

UTAH

Pipe Run at Tohonadla Area Wildcat in San Juan

Shell Oil Co.'s 2 Tohonadla, 2¼ miles southeast of the field discovery well, is at total depth 5,991 ft. Operator is running pipe.

Oklahoma Operators Dive Into Second Half With High Hopes

Oklahoma oil-hunters are busy in all sections of the state. The last half of 1957 seems destined for success and important oil happenings, particularly in the southwest, northwest, and south-central counties.

Southwest Oklahoma

Caddo County . . . A new-pay discovery is indicated at Sinclair Oil & Gas Co.'s field well at Alden (Susie). The 2 Susie, SE SE 1-6n-13w, found gas and oil in the Chester-Mississippian lime. The depth is around 3,900 ft. The field's discovery well, one of last year's exploratory highlights, found its production in the 9,000-ft. Bromide sands.

. . . Depth records fall. Oklahoma's deepest hole, Magnolia Petroleum Co. 1 Sterba-Ordovician, SW NE SW 35-6n-10w, Cement field geological wildcat, passed 18,160 ft. recently to set a new depth record for the state. Plans are to take the well to 20,000 ft.

Grady County . . . A new-pay discovery is indicated at the deepest producing area in the state, Carter-Knox field. British-American Oil Producing Co. 1 Krieger, SW SW 3-2n-5w, on the Stephens County side of the field, found Oil Creek-Ordovician at 16,484-16,630 ft. with pay indicated at 16,542-59 and 16,586-16,608 ft. The current state record, 15,645 ft., is in the same field at the 1 Reed. A new state producing-depth record seems likely at the Krieger well. Plans call for more Ordovician tests in the general Grady and Stephens County Knox area.

Kiowa . . . What may become one of the most significant strikes of the year, Carter Oil Co. 1 McDonald in NW SE SE 16-7n-14w, Mountain View area, found Simpson sand at 3,316 ft. and tapped about 90 ft. of pay zone. Gas flowed at the rate of 5,700 M.c.f. per day.

This significant hit lies between two large fault zones which run northwest-southeast near the Mountain View area just north of the Wichita Mountain uplift. The two zones are about 1 mile apart. It is believed that many such traps lie along this trend. Future drilling may prove this area to be highly inviting for the wildcatter.

Northwest and Panhandle

Beaver County . . . This easternmost Panhandle County continues to run strong in the drilling program of northwestern Oklahoma.

Ambassador Oil Co. has a new pay discovery at 1 State in Northeast Greenough field. The well, SW NE SW 14-6n-22eCM, found Marmaton at 5,385 ft. Gas flow was 4,640 M.c.f. per day at 5,494-5,502 ft. A production test of perforations at 5,503-06 ft. got 2,750 M.c.f. of gas and 36 bbl. of oil daily.

. . . Carter Oil Co. 1 Fickel, SW NE 16-3n-25eCM, is a Tonkawa discovery between Camp Creek and Ridgeway fields. Perforations at 5,514-38 ft. in the Pennsylvanian-Tonkawa got 6,160 M.c.f. of gas per day.

Harper County . . . Shell Oil Co. is finishing up at 1 State, a Chester-Mississippian gas-condensate discovery in NW SE 36-28n-25w.

The well flowed 2,300 M.c.f. of gas per day on first test at 6,476-6,566

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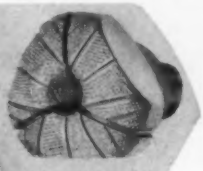

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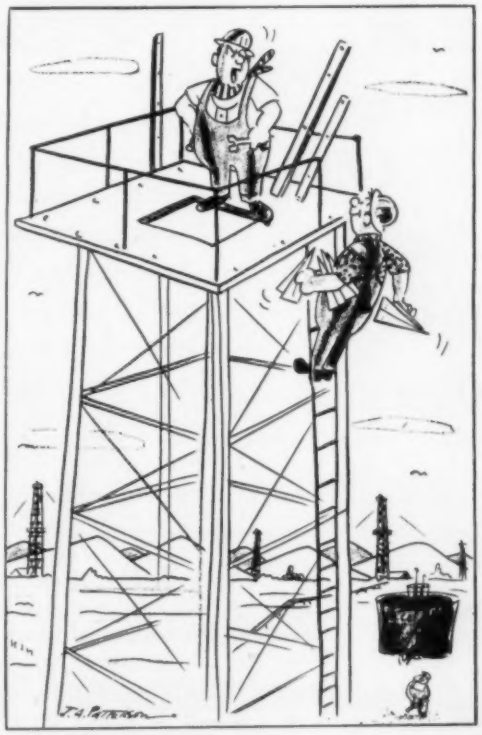

"What in blazes did you climb all th' way up here for?"

ft.; final test netted 2,820 M.c.f. of gas and 30 bbl. condensate per day.

. . . **Rank wildcat.** A rank wildcat discovery 8 miles southeast of production in the southeastern part of the county, flowed 28,000 M.c.f. of gas daily from Chester. Perforations were at 7,208-26 ft. This wildcat strike points up a vast area of southeastern Harper County for possible gas-condensate production. Very little drilling has been done in this part of the county which lies southeast of the rapidly expanding Southeast Stockholm and Laverne districts. The field-well development program in Harper County is one of the highest in the state. Many multipay areas are being expanded this year.

Woods County . . . Amerada Petroleum Corp. 1 Krob is an important Wilcox sand discovery near Dacoma in NW SE SW 24-25n-1w. The well flowed 257 bbl. of oil in 16 hours from perforations at 7,060-90 ft. after acidization. The average hourly flow rate was 17 bbl. This discovery is located on the eastern border of the county on what is known as the Pratt Anticline, a southward plunging anticline coming down from Pratt County, Kansas. Several Simpson fields have been opened in recent years around the flanks of this anticline in Woods County and in Comanche and Harper counties in Kansas.

Woodward County . . . Shell Oil Co. has a new pool for this county at 1 Garvie, NE NE 26-22n-17w. The Chester discovery flowed 1,500 M.c.f. of gas per day during production tests. Completion has not yet been reported.

. . . **British-American** will enter the Woodward Townsite play at a wildcat in SW SW NE 10-22n-22w. The well is 12 miles west of the recent Woodward gas-condensate (Morrow) discovery in 14-22n-20w, made by Union Oil Co. BA's location is located in the area believed to be a huge northwest-southeast Morrow-Pennsylvanian trap.

South Central

Cleveland County . . . The Viola lime is a new pay for the Rocky Point area. Oil Capitol Corp. 2 Allen, NW SE NE 32-8n-1w, flowed 160 bbl. of oil per day on small choke from perforations at 7,215-40 ft. This field is a Simpson sand producer and is one of the most active new fields in the state.

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When thousands of miles of sea, jungle, desert or rugged mountains separate you from service facilities—that's when a JENSEN's dependability is appreciated. The simple, trouble-free, long-life design of JENSEN JACKS has won them an enviable "standard equipment" position with knowing oil men in remote corners of the world and profit-wise producers in the States. There are 13 sizes and 24 models—one that will pump your well more profitably no matter where it is. Investigate—today!

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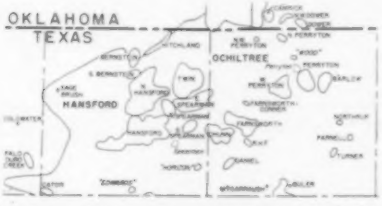
TEXAS

TEXAS PANHANDLE

New Map Released By Amarillo Firm

Browning Map Co., 310 Taylor Street, Amarillo, recently released an oil and gas field map of the Oklahoma and Texas Panhandles. Also included in the new release is a county ownership map of Oldham County.



Portion of Oil and Gas Fields map of the Texas and Oklahoma Panhandles, published by Browning Maps, Amarillo.

The company has been in the mapping business since the first of the year and expects to complete county maps covering the Texas and Oklahoma Panhandles, as well as the various combinations.

TEXAS GULF COAST

Fairbanks Outpost Opens New Oil-Producing Zone

An oil discovery nearly ¾ mile north of Fairbanks field, northwest of Houston, in Harris County, may lead

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Your well completion and production problems are materially reduced with W-K-M® Through-Conduit Gate Valves on your christmas trees. You get smooth non-turbulent fluid flow from tubing to gathering line with positive wellhead control.

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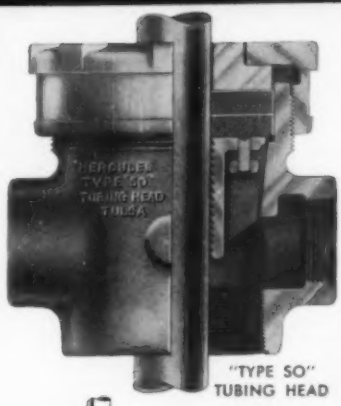
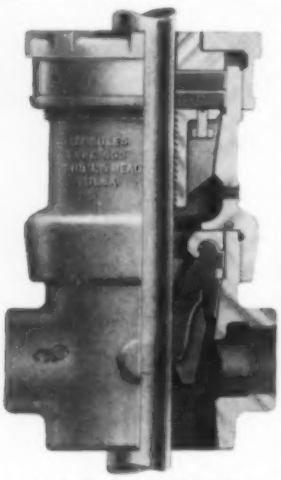
HERCULES "Type SO" Tubing Head is particularly suited for pumping due to compactness (only 12½" high). Stripper rubber can be used in body for running or wiping tubing. Also ideal for intermittently flowing wells.



"TYPE SO" TUBING HEAD



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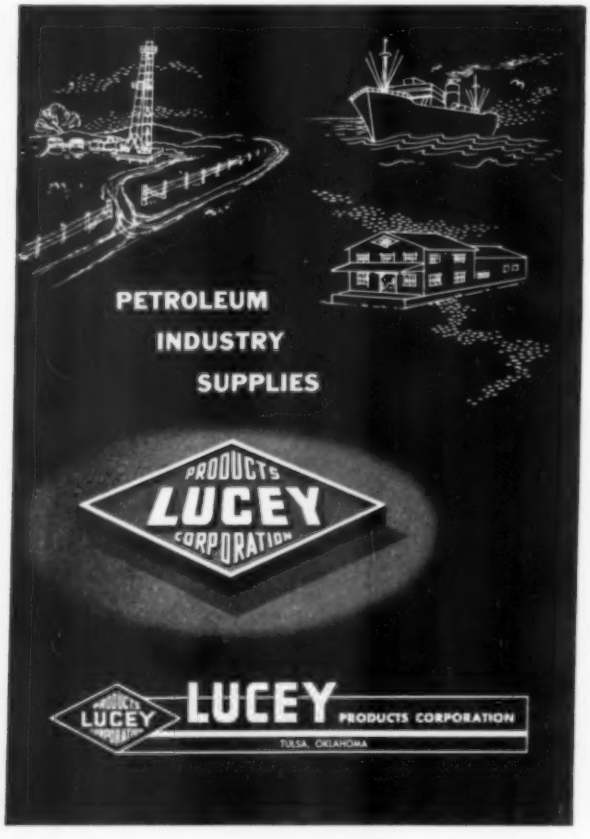

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the way to new development around that old area.

The discovery is by Armour Properties and Wesley West at their 1 Unit, drilled on a 20-acre lease in the Wiley S. Powell Survey. The well is completed with a rated flow of 151.80 bbl. of 41°-gravity oil per day through 9/64-in. choke. Its pay zone, perforated at 6,695½-98½ ft., is in a new reservoir for the field. A "new field" designation is sought for the area.

Fairbanks field dates from 1938 and produces from various Yegua zones from 6,500 ft. to below 7,300 ft. It has been the scene of active development, but in recent years, with its productive area considered fairly well drilled up, only an occasional new well has been put down. Nearest production to the new discovery is a well completed in 1938. Its production is from a sand at 6,845-48 ft.

East Mauritz Flanker Makes Larger Gas Flow

A gas well rated good for 130,000,000 cu. ft. of gas daily on open flow has been completed in the East Mauritz area, on the Wharton-Jackson county line.

The well, east of previous production on the Wharton county side, was drilled by John B. Coffee, of Houston. Production is from a 6,800-ft. sand, a new pay for the field. Total depth is 6,905 ft.

Gas is wet with a liquid recovery of 19.05 bbl. of distillate per 1,000,000 cu. ft. of gas. Flowing pressure gaged 2,450 psi. Shut-in pressure is 2,486 psi.

East Mauritz field was opened in 1944, and has been productive from four separate zones from 5,650 to 6,700 ft. Location of the new well, by far the largest gasser in the area so far, is about 15 miles southwest of El Campo.

WEST TEXAS

South Andrews Field Extension Is Completed

Jake L. Hamon 1 University "F" has been completed as a 1-mile east extension to the South Andrews field, in Andrews County. Official potential was 288 bbl. of 47°-gravity oil a day through 28/64-in. choke. Perforations in the Devonian were at 11,014-30 ft.

Location is in the northwest corner of Section 14, Block 1, University Lands Survey.

Delaware sand discovery . . . Ford Chapman & Associates 1 TXL, 10 miles northwest of Orla in Culberson County, has been completed as a flowing Delaware sand discovery.

Potential was 66 bbl. of 44°-gravity oil a day through 8/64-in. choke. There was no water. Production is from open hole at 2,552-58 ft.

Location is in Section 35, Block 58, Township 1, T&P Survey.

Dickens County Set For Deep Test

Fletcher Oil & Gas Drilling Co., Dallas, has moved into Dickens County for a rank wildcat test 4 miles southwest of Dickens townsite.

Location has been made for the firm's 1 Swanson Land & Cattle Co., on a 500-acre lease in the SE SE Section 369, Block 1, H&GN Survey. Projected depth was 7,800 ft., to test the Pennsylvanian.

Nearest and only production in Dickens County is Girard field in the southeastern corner of the county, near the town of Galpin. Girard field has production from the Tannehill sand, around 4,400 ft.

Pan American Petroleum Corp. was said to be supporting the test with acreage and cash.

You'll win more than this prize. You'll increase drilling efficiency and control your mud better. Mud-O-Graf records every variation in mud weight, saving time and costly errors in the addition of weighting materials. All heavy and light streaks in the circulating system and their duration are recorded. Mud-O-Graf shows how often the hole is filled up when coming out of the hole and shows the time of a complete circulation. If it's a question of mud, ask for Mud-O-Graf.

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WEST TEXAS

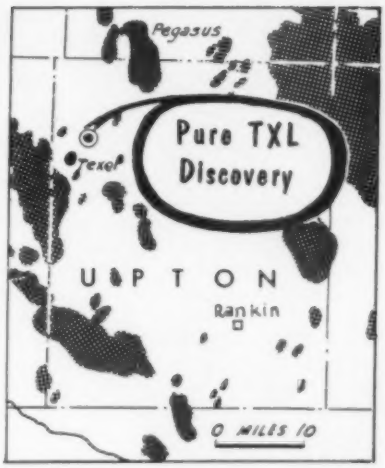
Upton County Test Is Pennsylvania Find

Pure Oil Co. and associates have completed their 1 TXL, in Upton County, as a Pennsylvanian discovery. Final flow gage of 644 bbl. a day through ¾-in. choke came after many weeks of thorough testing and acidizing the entire section.

Pay perforations were in limestone at 9,597-6,621 ft. There was no water on completion test; gas-oil ratio was 804:1, oil was 40°-gravity and tubing pressure was 125 psi.

No. 1 TXL is in Section 27, Township 5 South, Block 42, T&P Survey. It was drilled as an Ellenburger test, and entered that formation at 14,275 ft. on estimated elevation of 2,857 ft. Other markers were the Strawn lime at 9,758 ft., and the Devonian at 12,-404 ft.

Numerous gas shows were reported, and for a time it appeared the well would make a gas-distillate discovery in both the Devonian and Ellenburger. A test in the Devonian at 13,073-13,-153 ft. recovered 60 ft. of clean, dark condensate and condensate-cut mud, under flowing pressure of 1,205 psi. An Ellenburger test at 14,233-88 ft.



PURE OIL CO. has a flowing Pennsylvanian discovery at its 1 TXL in northwestern Upton County.

flowed gas, and recovery included 1½ bbl. of 64°-gravity condensate.

Total depth was 14,388 ft., plugged back to 9,797 ft.

The discovery is in the 1,280-acre Bug unit, 8 miles southwest of Sweetie-Peck field, and 35 miles south of Midland. Pure Oil owns 38 per cent interest in the unit. Others in the unit are TXL Oil Corp., Gulf Oil Corp., and H. L. Brown.

SOUTHWEST TEXAS

Flank Test at Benavides Makes Good Oil Producer

Concord Oil Co. and H. H. Howell have a good well on the east flank of the old Benavides-North Sweden area, 3 miles southeast of Benavides, in southeastern Duval County.

It is their 1 Vaell, in the St. Andres Grant. Completed in Yegua sand at 5,527-36 ft., it flowed 130 bbl. of 42.6°-gravity oil per day through ⅛-in. choke. Flow was under pressure of 785 psi. with gas-oil ratio of 590 cu. ft. per bbl.

Total depth is 6,301 ft.

In the same county, L. G. Shelly has confirmed his recent oil discovery north of Herbst field and east of Loma Novia field. The confirmation well, 2 Herbst, flowed 65 bbl. of 28°-gravity oil per day through ½-in. choke with pressure of 240 psi. and gas-oil ratio of 800 cu. ft. per bbl.

This well is 933 ft. southeast of Shell's discovery well, completed last June from Loma Novia (Jackson) sand perforated at 2,794-2,801 ft. The new well is perforated at 2,796-2,805 ft. A test northeast of the initial well was dry at 2,792 ft.

Don't let vapor losses (or other thieves) steal you blind.

1. Corrosion of tanks. Reduced when correct pressure setting is maintained on all tanks in storage battery, and oxygen is excluded.
2. Gravity drop (premium of 2c per barrel) can be stopped. Many users of vapor control system have reported gravity increases after installation.
3. Volume losses (2½% per degree gravity drop). Very substantial savings have been reported.
4. Lifting costs. These costs can be cut, because with the gravity and volume losses stopped, every barrel produced is saleable.

The elimination of any one of these thieves will more than pay for the installation of an Enardo vapor control system.

The Enardo 770 "By-Pass" thief hatch valve shuts off from the vent line for vapor control. When the hatch is open the "By-Pass" controls the opening into the vent line, sealing off the rest of the tanks in the battery. This automatically holds the correct pressure settings and excludes oxygen. Holding the pressure in all tanks prevents large gravity and volume losses during normal working conditions. The 770 Series hatches feature "bottle-tight" seals and De-icer action gaskets.

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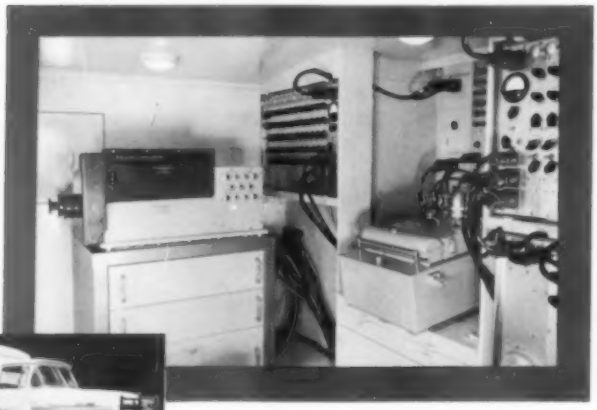
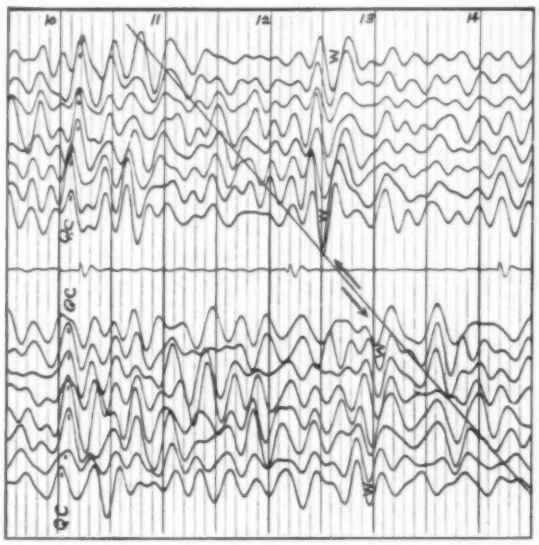


DATA UTILITY is improved by Petty's "Mobile Vari-Plotter." Integration of magnetic recording and complete data processing equipment into a single mobile truck unit saves invaluable time in producing fully corrected record sections right at the party location.



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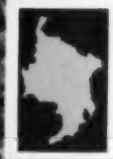

COLOMBIA

Color photographs
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VENEZUELA

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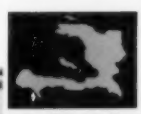
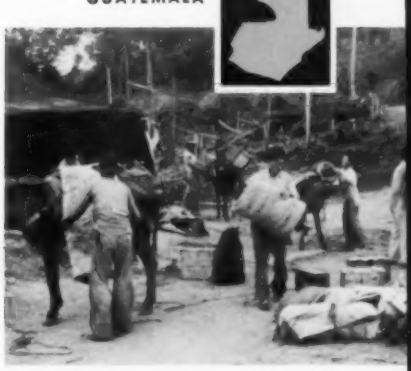


CUBA

GUATEMALA



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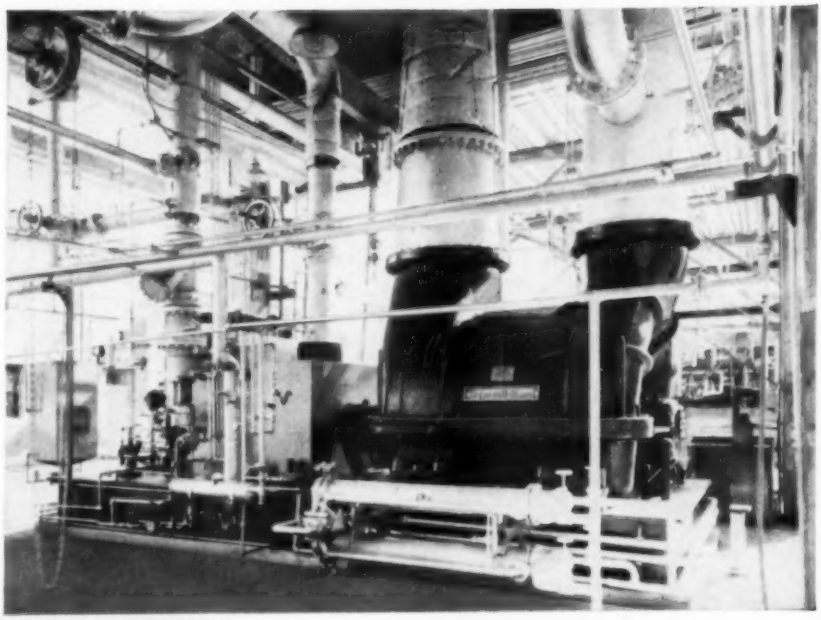
SAN ANTONIO 5, TEXAS

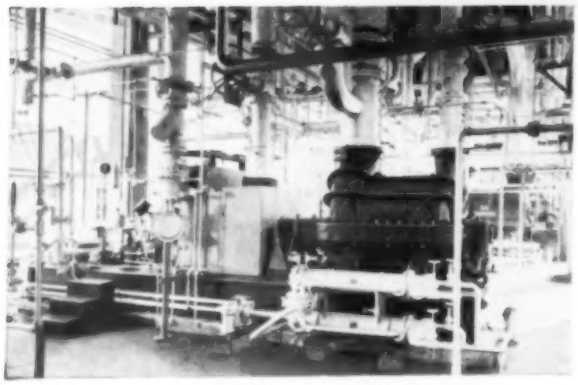
SEISMIC GRAVITY MAGNETIC SURVEYS

at Imperial Oil's new cat cracking plant...

Main air, cat gas and control air —all handled by Ingersoll-Rand centrifugals

At their Halifax gasoline-fuel oil refinery, Imperial Oil Limited recently installed five completely new process units, including a fluid-catalytic cracking plant with a capacity of 13,800 barrels per day (fresh feed). This modern unit, designed and constructed by Foster Wheeler, Ltd., converts light and heavy gas oil fractions into high octane gasoline, valuable gases and, if required, heavy cycle oil for fuel oil blending.





Main air blower for the cat-cracking unit is a 50,500-cfm capacity Ingersoll-Rand centrifugal driven by a 3600-hp I-R multi-stage, multi-valve steam turbine. The blower operates at 3500 rpm and delivers air at 30 psia.

Cat gas compressor has a capacity of 10,200 cfm. It is a 2300-hp, 6600-rpm unit with discharge pressure of 120 psia. Like the main air blower, it is driven by an I-R turbine operating at steam conditions of 580 psig, 700° F.T.T., 130 psig back pressure.

THIS installation of I-R centrifugals, which also includes a 5050-cfm capacity control air blower, is typical of Ingersoll-Rand's ability to provide all the air- and gas-handling equipment for any catalytic cracking process. Every I-R centrifugal is designed and built for maximum dependability and long-range economy in the particular service for which it is intended. When expansion or modernization involves new air- and gas-handling equipment, be sure to consult your Ingersoll-Rand representative. 12-634

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World traveler and oil hunter:

Van Beveren Still Moving Up

"IF A MAN likes people, places, and unusual sights, he should enter the business of searching for oil. His cup will run over."

So speaks O. F. Van Beveren, newly elected vice president and director of Standard Oil Co. of California, Western Operations, Inc. Van Beveren will coordinate and direct all the company's exploration activities in the seven Western states and Alaska.

In one of the biggest exploration jobs in the West, he will draw upon a wealth of experience with people and places gained in 24 years as a working geologist.

Van, as his friends and business associates know him, was born in Belgium 48 years ago and moved to the United States with his family when he was 7. By the time he was ready to enroll in the California Institute of Technology he had developed the love of land and outdoors which are part and parcel of being a geologist.

First a draftsman . . . By 1932 he had graduated cum laude from Cal Tech and taken his Master of Science degree in geology at the University of Colorado. He joined Standard as a draftsman the following year. From 1934 to 1937 he served as a geologist-geophysicist in the California oil fields.

In 1937 Van Beveren left the United States to work Standard's foreign operations, not to return until near the end of World War II. First he went to Mexico and the next year was named a geophysical supervisor in Java and Sumatra. Until 1942 he was closely tied to the pioneering work Standard did in these two Far East countries.

A 2-year stint as an engineer in Arabia was next during which time Van Beveren did his part to help develop the oil resources of the Middle East and assure free Europe an adequate wartime petroleum supply.

He spent his last year abroad, 1944, in Egypt, where he was married. The following year, the Van Beverens returned to California where Van became a geophysical supervisor for the parent company.

Exploration chief . . . In 1949 he was promoted to exploration superintendent in Bakersfield and in the 1950's became assistant general manager of exploration and finally general manager. He was elected to his present post in July of this year after serving for 11 months as special consultant on corporation exploration affairs.

O. F. VAN BEVEREN
. . . exploring brings rewards.

Outside of pride in his job, Van Beveren takes great joy in getting out in the garden of his home in Atherton, Calif., and working his acre and a half of landscaping and flower beds. Though he won't admit it, authoritative sources say that he has no peer in amateur horticultural skills.

Atherton is also home to wife Mary Agnes and children Charles, Carol and Jean. They keep it ready at all times for his return from the Rockies, or the forests of the Pacific Northwest, where he has been supervising the company's exploration program.

Paul Smith has been named assistant director of the chemical research division of Esso Research & Engineering Co. Smith has been acting assistant director since January when he returned from an assignment in England.

W. L. Davis, formerly assistant to the manager of geophysics for Continental Oil Co. in Houston, has been transferred to New Orleans as division geophysicist. He will open a geophysical office in New Orleans for the C.A.T.C. group (Continental, Atlantic, Tidewater, and Cities Service).

Personals

Charles Peters has joined Raymond Oil Co. in Denver as geologist. Peters was formerly a consultant.

Pat Jarratt, Jr., project engineer with Spencer Chemical Co. in Kansas City, has been appointed senior project engineer in Houston.

E. R. Osburn has been named general manager of Fish Northwest Constructors, Inc., in Houston. Osburn is a retired executive of Texas Pipe Line Co. interests.

Jack M. Dennis has been promoted by The Texas Co. from field enginer to petroleum engineer and transferred to Wichita Falls, Tex., from Gainesville, Tex.

James Edward Harrison, formerly staff geophysicist at New Orleans for Pan American Petroleum Corp., has been named district geophysicist of the company's East Texas district at Tyler. The position is a new one. Harrison has been with Pan American since August 1950.

O. W. (Buzz) Fauntleroy has resigned as geologist with R. Clay Underwood, Wichita Falls, Tex., oil producer, to open consulting offices in Wichita Falls. Fauntleroy was area geologist with Bolin Oil Co. before joining Underwood. He is immediate past president of North Texas Geological Society.

Auby Rowe, Jr., has been appointed division manager at McAlester Fuel Co.'s new Billings, Mont., Rocky Mountain division office. Also in the Billings office will be **F. A. Hunt,** division superintendent; **J. O. Staggs,** division geologist; **W. C. Fincher,** division engineer; and **W. H. Maloch, Jr.,** division landman.

W. F. Schoenthaler has moved up from manager of distribution for Shell Chemical Corp. to manager, transportation, for Shell Oil Co. in New York. Schoenthaler replaces **K. W. Martin,** who was recently named manager of the New Orleans exploration and production area transport and material department. **M. H. W. Dent,** manager of the products department, succeeds Schoenthaler as Shell Chemical Corp. distribution manager. **R. H. Tubman,** assistant manager of the operations department in New York since 1956, has been appointed to succeed Dent as manager of the products department.

Personals

H. J. KLEEN

Harold J. Kleen, chief geologist for Kerr - McGee Oil Industries, Inc., has been appointed manager of land, geological, and geophysical departments, a new position. **Walter Marlin,** formerly superintendent of the land department, has been named special assistant to **J. C. Finley,** vice president in charge of exploration. In a number of other changes in Kermac's exploration department, **J. A. Masters,** Canadian division geological manager, moves up to regional geological manager in charge of the southern division, West Texas-New Mexico division, and Canadian division. He will transfer to Oklahoma City from Calgary. **R. L. Duncan,** district geologist, replaces Masters in Calgary. **L. W. Curtis,** formerly a division manager, has been named regional geological manager in charge of the Central division, Rocky Mountain division, and Panhandle district. **D. L. Amonett,** geophysicist, has moved up as chief geophysicist.

W. K. Venatta has been named manager of Oronite Chemical Co.'s Oak Point, La., plant. Venatta succeeds **T. I. Clausen,** who has transferred to California Research Corp.

David C. Davies has joined Home Stake Production Co. in Tulsa as production engineer. He was formerly engineer with Salmon Oil Corp. in Garnett, Kans.

J. R. Weber, junior geophysicist in Shell Oil Co.'s Houston office, has been transferred to Corpus Christi, Tex., as seismologist in the exploration department.

B. N. (Bill) Barnes has been transferred by Sinclair Oil & Gas Co. from Fort Worth to Amarillo, Tex., where he will be district geologist. He succeeds **G. L. Meholin,** who has been appointed staff geologist at Fort Worth.

L. Edward Klein and **David T. Mowry** have been named assistant directors in the development department of Monsanto Chemical Co.'s organic-chemicals division in St. Louis. Klein was formerly section head in charge of development work on intermediates and exploratory chemicals. Mowry has been in charge of fine chemicals development.

Sterling Little, New Orleans consulting geologist, has been retained by Zapata Off-Shore Co. to represent it exclusively in its tidelands operations.

Jack O. Duggan, gas engineer in Kilgore, Tex., with Magnolia Petroleum Co., has been transferred to Falfurrias, Tex., in the same capacity.

Earl Gordon Griffith, formerly Denver district exploration manager for Tennessee Gas Transmission Co., has joined William Ross Cabeen & Associates, Denver.

Raymond O. Courtright, Jr., has resigned as head of the engineering department of B. L. McFarland Drilling Co. to become production superintendent and engineer for Grover, MacCurdy & Knox at Midland, Tex.

G. Montgomery Mitchell has joined Felmont Oil Co. in Bradford, Pa., as general superintendent of the pipeline construction division. He was formerly chief design engineer with New York State Natural Gas Corp.

C. F. Caliga has been named offshore Louisiana exploration division superintendent for The California Co. **K. M. Waters, Jr.,** has been appointed assistant to the eastern region's chief development geologist. Both will headquarter in New Orleans.

Charles A. Shaw has resigned as a senior geologist for Union Oil & Gas Corp. of Louisiana to open offices in Dallas as an independent operator and consultant. He is being joined in the venture by his brother, **J. Langford Shaw,** veteran Oklahoma operator, who will move from Ada, Okla., to Dallas.

R. E. McCulloch, Tekoil Corp.'s superintendent of operations for three midwestern states, **Murray E. Guyer,** head of land evaluation, and **Robert E. Shaw,** Tekoil secretary - treasurer, have been transferred to Oklahoma City from Robinson, Ill. The moves are the result of plans to consolidate operations personnel in Oklahoma City.

Robert H. Garrison, Hellman Estate, has been elected chairman of the Conservation Committee of California Oil Producers. Also elected were **D. G. Kingman,** General Petroleum Corp., first vice chairman; **R. J. Stephens,** Kern Oil Co., second vice chairman; and **R. B. Hodgson,** Tidewater Oil Co., secretary. **Paul E. Terry,** Capital Co., is chairman of the administrative committee, and **B. P. Bayliss,** Lloyd Corp., Ltd., has been named chairman of the engineering board.

R. C. FAULKNER

R. C. Faulkner, general manager of Gulf Oil Corp.'s Port Arthur, Tex., refinery, has been transferred to Pittsburgh where he will head mechanical design and construction in the Pittsburgh engineering division of the manufacturing department. Gulf has appointed four refinery general managers. **J. O. Timms,** general manager of the Philadelphia refinery, has been named general manager at Port Arthur, succeeding Faulkner. **T. A. Dietz,** manager of engineering at the Philadelphia refinery, will replace Timms as general manager there.

T. F. Hogan, manager of operations at Port Arthur, has been transferred to Cincinnati as general manager of the refinery there. He succeeds **A. A. Niehenke,** now general manager at the Toledo refinery. Niehenke has succeeded **D. E. Hart,** who has been transferred to Port Arthur as manager, operations. **H. M. Vaughan,** manager, engineering, at Port Arthur, has been transferred to Philadelphia in the same capacity, succeeding Dietz. **R. S. Justiss,** director of mechanical design in the Pittsburgh engineering division of the manufacturing department, has been moved to Port Arthur as manager, engineering, replacing Vaughan.

In other manufacturing department changes, Gulf has sent **J. N. Miller,** director of process engineering at Port Arthur, to the process design division in Pittsburgh. **B. A. Kreiter,** now in process design, Pittsburgh, will transfer to Port Arthur, succeeding Miller.

Robert L. Ludlum, assistant manager of the ammonia division at Shell Chemical Corp.'s Martinez, Calif., chemical plant, has been named senior engineer in the engineering department.

J. O. Sanders has been appointed superintendent of The California Co.'s Delta-Gulf Coast production division. **R. E. France** has been named superintendent of the company's South Louisiana production division. Both divisions are the result of a reorganization of the company's old Gulf Coast division. **Delbert D. Jackson** has been named to succeed France as superintendent of Calco's North Louisiana-Mississippi production division in Natchez, Miss. In other appointments, **G. N. Hile** has been appointed senior consultant, plant and gas operations, and **A. L. Smith** has been named supervising construction engineer for offshore design adaptation unit, New Orleans.

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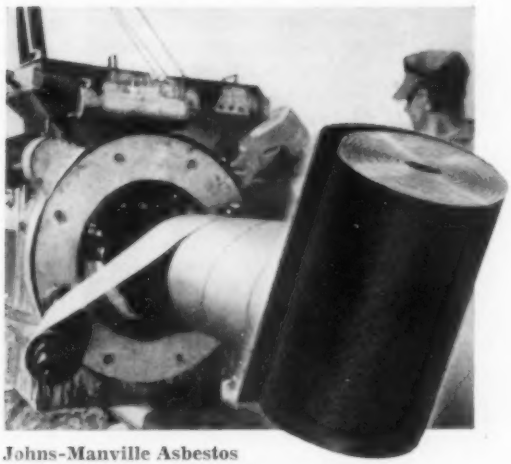

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Johns-Manville PRODUCTS FOR PIPELINE PROTECTION

Personals

Joseph W. Meehan, general manager of Pure Oil Co.'s crude-oil purchasing division and president of Pure Transportation Co. and Arapahoe Pipe Line Co., has joined Derby Refining Co., refining and marketing subsidiary of Colorado Oil & Gas Corp., as vice president in charge of transportation and crude-oil supply. Meehan had been with Pure 25 years.

Richard Burroughs, geologist, has been transferred to Amarillo, Tex., from Bismarck, N. D., by Pure Oil Co.

Charles Sandy, geologist with W. C. McBride, Inc., has resigned to open consulting offices in Evansville, Ind.

Fritz Johnson has joined Pan American Petroleum Corp. in Oklahoma City as junior geologist.

Jack Schmidt, district geologist, and **Miles McDow,** district landman, with Nortex Oil & Gas Corp., have been transferred to the company's new Midland, Tex., office from Dallas.

James H. Moore, senior geologist with Sunray Mid-Continent Oil Co., has been transferred to Oklahoma City from Corpus Christi, Tex.

William T. Maddock, advanced process engineer with Ohio Oil Co., has been transferred to Findlay, Ohio, from Ohio's Robinson, Ill., refinery.

Ralph Smalley, Jr., has been promoted by Pan American Petroleum Corp. from petroleum engineer in Casper, Wyo., to field engineer in Worland, Wyo.

Frank P. DeMasi, Ohio Oil Co. petroleum engineer, has been transferred to Bradley, Okla., where he will work with Ohio's primary production in the Bradley field in Grady County. DeMasi was formerly in Robinson, Ill., in secondary-recovery operations.

E. S. (Jack) Villines has opened consulting offices in Lakin, Kans. Villines was formerly president and general manager of Acid Engineers, Inc., a firm he organized in 1944. He was with Dowell Incorporated and Shell Oil Co. before that time.

G. W. Davis, Jr., petroleum engineer with The California Co., has been transferred from the company's area office at Barataria, La., to Denver.

Tom Odiorna, Sun Oil Co. geologist in Denver, has been transferred to Bismarck, N. D. Odiorna replaces **Alan Hansen,** recently transferred to Salt Lake City.

Eldred E. Young has been transferred from Shell Oil Co.'s Norco, La., refinery, to Shell Development Co.'s Emeryville, Calif., research center as engineer in the process engineering department.

Hanford Drummond, consulting geologist, has moved his offices from Denver to Calgary. Drummond was with Union Oil Co. in Denver before becoming a consultant last year.

F. J. Adler, district exploration geologist, **W. M. Freeman,** district development geologist, and **R. A. Wolgast,** district landman, for Phillips Petroleum Co., have been transferred from Albuquerque to the company's new Durango, Colo., office. The Albuquerque land and geological offices have been closed. Also transferring to Durango are **J. R. Bales, Sam Boggs, Jr., J. A. Englehorn, W. S. Fredericks,** and **John Liming,** exploration geologists; and **P. R. Dessieux, Joe Estill,** and **S. J. Smith,** development geologists.

B. J. LANCASTER

B. J. Lancaster has been appointed resident engineer for Atlantic Refining Co.'s Dallas engineering and construction department. He will be in charge of the company's southwest and Venezuelan sections. He succeeds the late Darcy W. Henwood. A graduate of the University of Texas, Lancaster was formerly field group supervisor in the southwest section. He has been with Atlantic since 1948.

William Alexander, Jr., has been appointed resident engineer for General Petroleum Corp.'s coastal division with headquarters in Ventura, Calif. Alexander has been on assignment with the Iranian consortium for 2 years. He has been with the company since 1939. **B. K. Webb,** senior petroleum engineer, has been transferred to Ventura from Taft, Calif. **I. M. MacKenzie, Jr.,** will succeed Webb as senior petroleum engineer in Taft. He was formerly in Ventura. Webb joined General Petroleum in 1943, MacKenzie, in 1945.

Max Bailey, tool pusher, has been transferred from Sweetwater, Tex., to Cortez, Colo., by FWA Drilling Co.

S. R. Knapp, tool pusher, has been transferred by Falcon Seaboard Drilling Co. from Elk City, Okla., to Lindsay, Okla.

James J. Johnson has left Pan American Petroleum Corp., where he was engineer in Wichita, to join Ramsey Engineering, Inc., in Oklahoma City.

DEATHS

H. T. (Ash) Ashton, who retired last year as head of the central marketing region of Socony Mobil Oil Co., died August 9 at Pointe au Baril in the Georgian Bay area of Ontario. Ashton's industry career began in 1913 with Columbus Gas & Fuel Corp. When he retired in July 1956, he was honored by a dinner in Chicago (OGJ, July 9, 1956, p. 69). He had served as head of Oklahoma sales and refineries for Pure Oil Co., later as president of Lubrite Refining Corp.

When Lubrite was absorbed by Socony, Ashton became head of Socony's Lubrite division. For technical achievement in developing a thermal cracking process, Ashton was honored by his alma mater, Miami University, in 1948. He was a founder of Natural Gasoline Association of America and of the 25-Year Club of the Petroleum Industry. He was a past president and currently executive secretary of the 25-Year Club. He was a longtime director of Western Petroleum Refiners Association and a past W.P.R.A. president.

George W. Ring, 69, president of Ring Oil Co., Los Angeles, died August 12 in Los Angeles. In addition to his oil industry activities, Ring was a prominent figure in thoroughbred racing in recent years.

Arthur Dooley, president of Arthur Dooley & Son., Inc., Beaumont petroleum equipment firm, died August 4. Dooley began a predecessor company in 1925. The present company was incorporated in 1939.

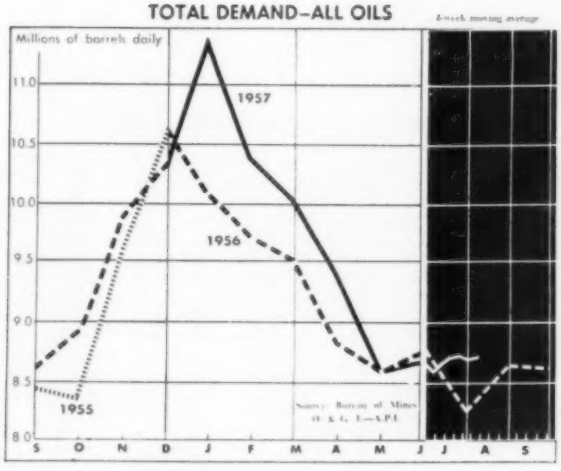
Charles M. Lind, 45, geologist with Humble Oil & Refining Co. in Corpus Christi, Tex., died August 8 in Houston.

C. C. (Charley) Hooks, who with four brothers was well known as an operator of machine shops in the early oil fields of Oklahoma, Texas, and Illinois, died recently at his home in Preston, Mo.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,790,800	DOWN	87,050	DOWN	379,345
Crude stocks	285,822,000	UP	581,000	UP	6,779,000
Completions	1,121	UP	8	DOWN	87
Refinery runs	8,008,000	UP	89,000	UP	23,000
Gasoline stocks	172,973,000	DOWN	3,021,000	DOWN	4,584,000
Kerosine stocks	32,554,000	UP	1,100,000	UP	2,922,000
Distillate stocks	141,999,000	UP	3,769,000	UP	17,826,000
Residual stocks	50,138,000	UP	998,000	UP	4,597,000
Four-product stocks	397,664,000	UP	2,846,000	UP	20,761,000
Total imports	1,680,100	DOWN	13,600	UP	467,200



Stock Total in Terms of Days' Supply Is Highest Since 1954

THE PRESSURE on markets from stocks is two-pronged. Stocks are too high. The distribution by product and by area leaves much to be desired.

The table at the bottom of the page shows end-of-July stocks and total demand for July back through the year 1935. From these figures the ratio of stocks to demand or days' supply has been calculated for each year. Note that there was a very definite decline in days' supply to the end of World War II. This was the period of improved transportation and distribution.

The figures show that stocks represented 184 days' supply at the end of July 1935 and had dropped to about 84 days for 1945. Since that time, the ratio of stocks to demand had fluctuated but has shown no definite downward trend.

Low points for days' supply in the postwar period were 86.5 in 1947 and 86.9 in 1951. The median for the 12-year period is about 93.3.

There is every reason to believe that postwar demands could have been met without some of the big stock increases during the summer months. Better scheduling and a gain in movement by pipeline have made it unnecessary for primary suppliers and producers to keep 90 days' supply of crude and products on hand during the summer.

Total stocks at the end of last month represented 94.5 days' supply at the July demand rate. Most refiners would agree that excessive stocks have been a factor in low product prices this summer. Also, the fact that many crude buyers are preparing crude purchases in several states shows that crude tanks are about full.

The greatest pressure from surplus stocks is in the distillate market. Stocks of kerosine and distillate fuels amounted to 174,553,000 bbl. on August 10 for an increase of 20,748,000 bbl. over last year.

The cargo price for No. 2 fuel on the Gulf Coast is 8.75 cents a barrel and probably could be bought at 0.25 cent under that. No. 2 fuel is selling for less this summer than it did in 1948.

Esso Standard Oil Co. announced reductions in residual prices, effective August 14. The new barge price for No. 6 in New York Harbor is $2.95 a barrel.

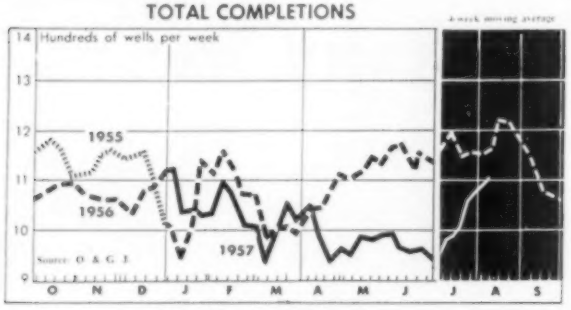
STOCKS VS. DEMAND

(Total stocks at the end of July and total demand for July)

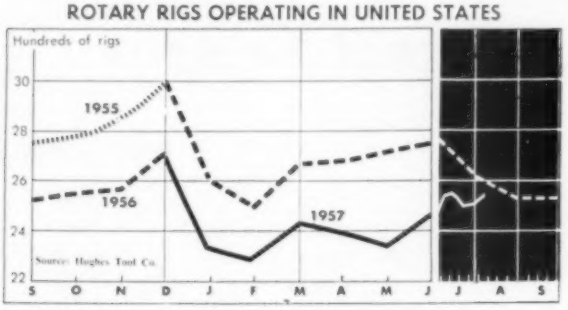
	Crude and product stocks†	Total demand*	Days' supply
1935	566,049	3,073	184.2
1936	545,794	3,404	160.3
1937	554,389	3,818	145.2
1938	584,653	3,598	162.5
1939	572,107	3,799	150.5
1940	574,030	3,799	151.1
1941	548,029	4,402	124.5
1942	508,344	4,099	124.0
1943	483,003	4,617	104.6
1944	474,851	5,025	94.5
1945	453,159	5,407	83.8
1946	490,771	5,252	93.4
1947	499,884	5,777	86.5
1948	537,659	5,974	90.0
1949	634,489	5,730	110.7
1950	567,476	6,505	87.2
1951	614,615	7,072	86.9
1952	650,275	7,078	91.9
1953	712,439	7,504	94.9
1954	753,160	7,479	100.7
1955	736,904	7,966	92.5
1956	767,614	8,234	93.1
1957	819,000	8,670	94.5

*Thousands of barrels daily. †Thousands of barrels.

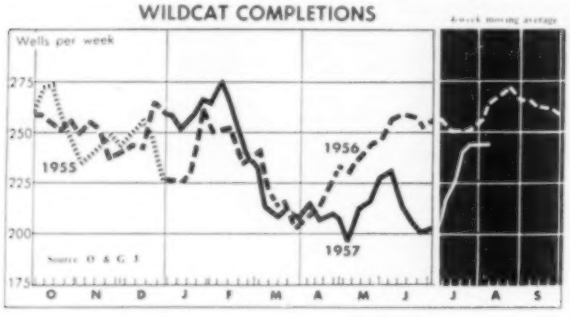
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	8-12-57	8-5-57	8-13-56
North Central and East	104	98	125
Southeast	37	40	40
Okla., Kans., Ark., Mo.	458	457	450
Louisiana	424	420	467
North and East Texas-Panhandle	367	350	356
Gulf and South Texas	208	209	227
West Texas-New Mexico	540	545	490
Rocky Mountain	293	281	262
Pacific Coast	115	113	108
Total United States	2,546	2,513	2,525
Canada	176	193	241

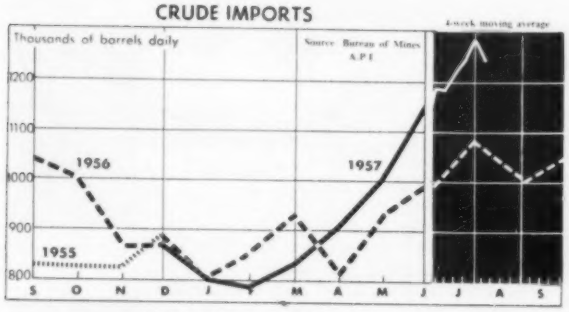
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 10, 1957

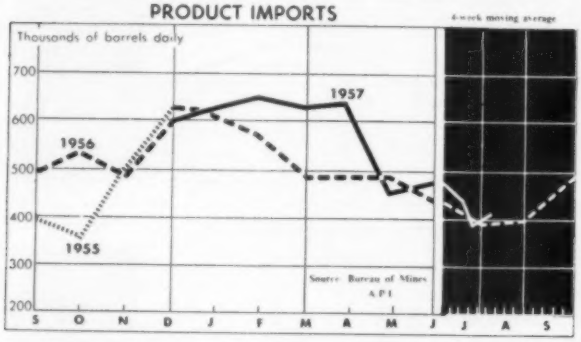
	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1957	1956	Total	Crude	Cond.	Gas	Dry	1957	1956
Alabama	2	2	0	0	0	0	22,911	60	‡66	0	0	0	0	0	18	‡30
Arkansas	18	9	0	0	9	0	61,185	646	511	5	0	0	0	5	120	113
California	39	28	0	1	10	0	156,409	1,287	1,346	13	3	0	0	10	322	300
Colorado	19	5	0	2	12	0	113,282	523	722	11	3	0	0	8	353	362
Illinois	88	35	0	0	53	0	190,088	1,512	2,346	14	0	0	0	14	382	454
Indiana	15	6	0	0	9	0	27,973	373	396	1	0	0	0	1	77	85
Kansas	76	34	0	5	36	1	283,167	2,530	3,168	18	4	0	0	14	505	662
Kentucky	35	7	0	0	28	0	36,125	853	1,098	11	0	0	0	11	172	257
Louisiana	80	40	1	10	29	0	555,575	2,301	2,355	9	1	0	0	8	410	470
North	43	22	0	4	17	0	183,711	813	982	3	0	0	0	3	109	153
South	20	9	1	3	7	0	204,541	1,051	1,097	5	0	0	0	5	248	267
Offshore	17	9	0	3	5	0	167,323	437	276	1	1	0	0	0	53	50
Michigan	16	1	0	10	5	0	41,758	253	274	3	0	0	0	3	95	99
Mississippi	10	2	1	0	7	0	63,357	226	273	3	0	0	0	3	117	130
Montana	10	3	0	0	7	0	41,603	238	247	5	0	0	0	5	85	85
Nebraska	13	4	0	0	9	0	66,593	523	628	9	0	0	0	9	296	305
New Mexico	34	19	0	10	5	0	148,379	1,281	1,173	3	1	0	0	2	168	149
Northwest	19	7	0	9	3	0	81,025	506	462	3	1	0	0	2	62	44
Southeast	15	12	0	1	2	0	67,354	775	711	0	0	0	0	0	106	105
New York	11	4	0	0	2	5	19,070	279	.....	2	0	0	0	2	4	.....
North Dakota	9	6	0	0	3	0	77,636	169	151	4	1	0	0	3	70	46
Ohio	16	6	0	4	6	0	31,638	652	607	0	0	0	0	0	7	6
Oklahoma	113	54	2	1	49	7	420,992	3,760	5,339	14	0	0	0	14	429	557
Pennsylvania	31	13	0	5	3	10	65,890	431	†633	0	0	0	0	0	36	†16
Texas	454	244	13	19	175	3	1,744,970	13,306	13,539	104	6	0	0	98	3,305	3,484
District 1	24	5	0	3	16	0	64,929	759	*2,013	14	0	0	0	14	267	*680
District 2	21	9	3	3	6	0	126,810	462	*1,625	4	0	0	0	4	173	*526
District 3	25	11	4	0	10	0	157,033	1,077	.....	5	0	0	0	5	315	.....
District 4	16	8	2	1	5	0	64,855	854	.....	1	0	0	0	1	292	.....
East	38	22	3	1	12	0	171,086	783	668	7	0	0	0	7	235	253
District 7-B	70	38	1	0	31	0	195,536	1,737	.....	22	4	0	0	18	626	.....
West	129	83	0	1	45	0	582,256	3,778	3,535	30	1	0	0	29	560	579
District 9	98	46	0	2	47	3	274,030	2,971	*4,880	20	1	0	0	19	772	*1,368
District 10	33	22	0	8	3	0	108,435	885	818	1	0	0	0	1	65	78
Utah	5	3	0	0	2	0	25,102	120	79	2	1	0	0	1	65	47
West Virginia	16	3	0	9	4	0	40,265	383	396	1	0	0	1	0	19	13
Wyoming	11	6	0	0	5	0	66,459	494	490	5	1	0	0	4	168	138
Miscellaneous	0	0	0	0	0	0	0	58	64	0	0	0	0	0	41	56
Total U. S.	**1,121**	534	17	76	468	26	4,300,427	32,258	35,921	**237**	21	0	1	215	7,264	7,864
Total prev. week	1,113	546	12	93	438	24	4,460,457	.....	.....	231	19	2	8	202	.....	.....
Cum. 1957	32,258	16,776	285	2,348	12,167	682	133,950,000	.....	.....	7,264	767	63	275	6,159	.....	.....
Western Canada	66	33	0	7	25	1	313,248	1,878	1,774	24	3	0	3	18	537	.....

*Districts: 2 & 3, 1 & 4, 9 & 7-B, formerly combined. †Incl. New York. ‡Incl. Florida and Georgia.

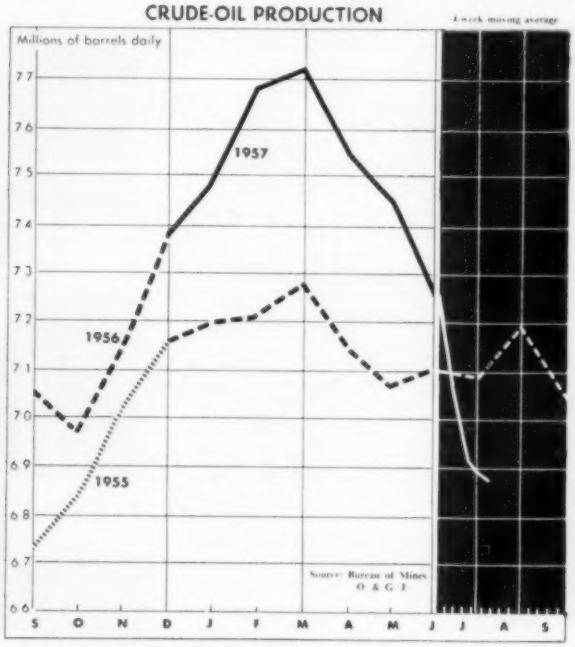
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION



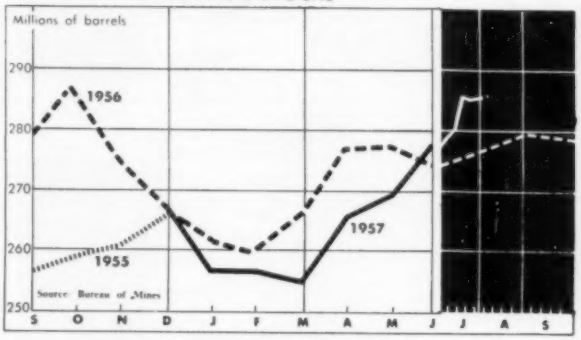
DAILY AVERAGE PRODUCTION FOR WEEK

	August 10, 1957			Aug. 3
	Crude oil	Lease condensate	Total	total
Alabama	13,700	.....	13,700	13,750
Arkansas	84,850	300	85,150	85,300
California	925,300	.....	925,300	931,700
Colorado	149,100	.....	149,100	153,300
Eastern	52,500	.....	52,500	52,100
Florida	1,300	.....	1,300	1,300
Illinois	162,900	.....	162,900	160,400
Indiana	29,000	.....	29,000	28,800
Kansas	†335,950	.....	†335,950	†331,600
Kentucky	39,000	.....	39,000	39,600
Louisiana	723,600	72,400	796,000	846,425
North	123,600	2,400	126,000	125,000
South	600,000	70,000	670,000	721,425
Michigan	24,300	.....	24,300	24,300
Mississippi	103,800	4,400	108,200	112,750
Montana	73,050	.....	73,050	73,100
Nebraska	52,600	.....	52,600	53,200
Nevada	100	.....	100	100
New Mexico	245,500	3,900	249,400	254,400
North Dakota	39,550	.....	39,550	46,500
Oklahoma	†537,600	.....	†537,600	†558,100
Texas	2,760,000	53,700	2,813,700	2,800,125
Dist. 1	51,000	450	51,450	52,175
Dist. 2	126,000	8,450	134,450	134,450
Dist. 3	404,000	26,400	430,400	427,550
Dist. 4	210,000	6,200	216,200	216,200
Dist. 5	36,000	300	36,300	36,300
Dist. 6	122,000	6,300	128,300	128,300
East Texas Field	173,000	.....	173,000	173,000
Dist. 7-B	151,000	50	151,050	151,050
Dist. 7-C	143,000	3,575	146,575	144,425
Dist. 8	1,033,000	1,200	1,034,200	1,028,475
Dist. 9	204,000	350	204,350	202,200
Dist. 10	107,000	425	107,425	106,000
Utah	11,100	.....	11,100	11,900
Wyoming	291,150	.....	291,150	299,000
Others	‡150	.....	‡150	‡100
Total U. S.	6,656,100	134,700	6,790,800	6,877,850
Change from prev. week, down			87,050	.....
Canada	†470,500	.....	†470,500	†543,300

Total U. S. production, January 1-August 10 ..... 1,643,714,450 bbl.
Same period last year (crude plus cond.) ..... *1,595,927,674 bbl.

*Includes 27,662,230 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

CRUDE-OIL STOCKS



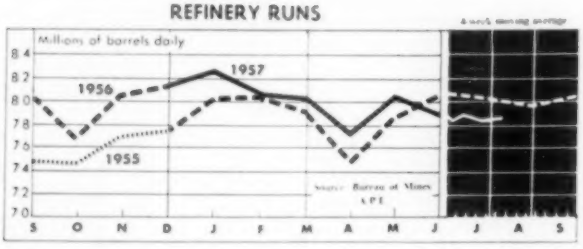
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

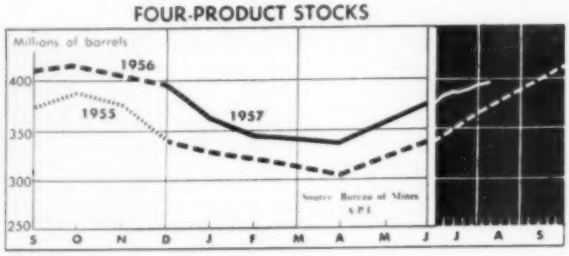
	8-3-57	7-27-57	8-4-56
Pennsylvania Grade	2,996	2,994	2,488
Other Appalachian	1,540	1,506	2,432
Illinois, Indiana, Michigan	10,891	11,411	10,485
Nebraska, North Dakota	2,213	2,382	2,905
Kansas	11,150	11,401	9,462
Oklahoma	22,399	22,094	27,102
Arkansas	3,225	3,355	2,851
Louisiana	19,550	19,472	16,840
North	3,875	3,873	2,624
South	15,675	15,599	14,216
Mississippi, Ala., and Fla.	2,765	2,490	3,265
New Mexico	9,220	9,132	7,993
Texas	128,558	128,531	123,442
East Texas proper	9,731	10,097	9,179
West Texas	62,711	62,561	59,597
Texas Gulf	23,603	24,545	23,055
Other Texas	32,513	31,328	31,611
Wyoming	17,900	17,841	20,447
Other Rocky Mountain	6,515	6,654	6,838
California	29,899	29,708	27,337
Foreign	†17,001	16,270	15,156
Total	285,822	285,241	279,043

*Bureau of Mines. †Includes 4,400,000 bbl. in California.

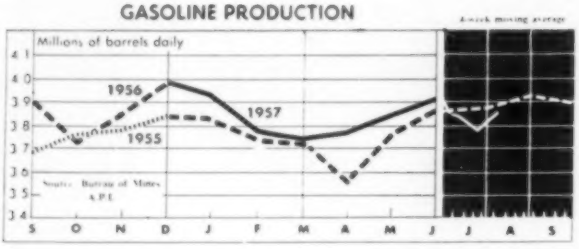
REFINERY RUNS



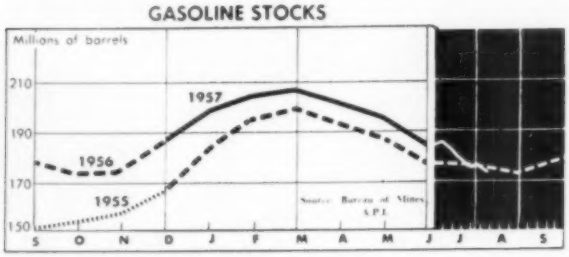
FOUR-PRODUCT STOCKS



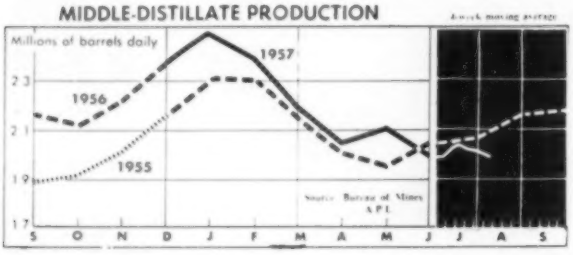
GASOLINE PRODUCTION



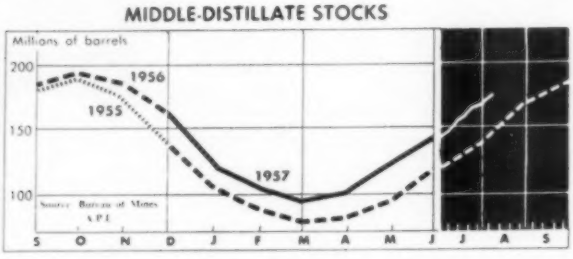
GASOLINE STOCKS



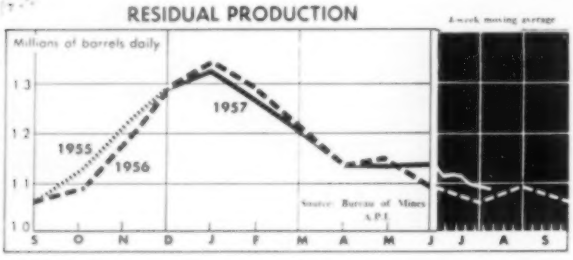
MIDDLE-DISTILLATE PRODUCTION



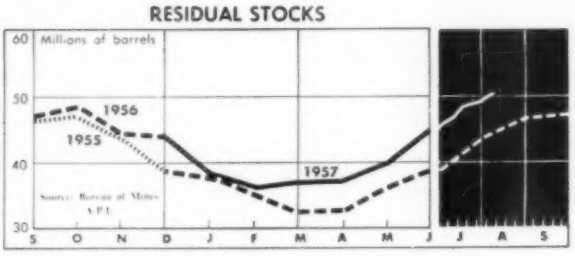
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, AUGUST 9, 1957

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1956 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,296	538.2	37.9	283.6	229.1	40,294	13,117	50,915	12,660	1,140	492.1	32.6	320.6	181.1
Appalachian:														
District 1	94	41.6	3.3	20.4	3.4	4,426	562	2,773	520	99	38.0	3.3	23.9	5.2
District 2	47	30.3	1.1	9.0	7.0	2,465	617	775	219	106	51.7	4.9	17.1	12.6
Ind., Ill., Ky.	1,285	666.0	52.4	245.9	134.9	30,215	6,391	20,553	5,518	1,407	739.5	72.6	286.2	150.2
Minn., Wis., Dak.	106	49.1	7.1	28.4	8.3	5,522	1,448	7,161	421	70	34.8	6.2	19.3	3.8
Okla., Kans., Mo.	770	436.7	21.4	170.0	29.6	14,297	1,748	12,787	1,060	703	375.5	15.4	167.3	29.8
Inland Texas	258	201.7	5.3	50.0	19.1	6,703	363	2,538	1,879	274	202.2	5.9	52.7	25.1
Texas Gulf Coast	1,914	940.4	99.6	482.4	237.7	23,103	3,247	16,864	7,415	1,966	948.9	111.7	498.2	241.1
La. Gulf Coast	666	371.6	50.3	163.4	41.3	10,277	3,482	6,858	1,553	714	361.2	47.9	196.3	55.1
N. La. and Ark.	72	25.7	6.0	18.3	5.0	3,985	933	2,132	160	103	38.0	5.0	24.2	6.9
Rocky Mountain:														
New Mexico	28	13.6	0.7	5.4	3.0	412	12	134	74	26	13.5	0.2	5.1	3.4
Other Rocky Mtn.	286	141.1	2.7	59.4	39.6	6,105	283	3,223	990	281	129.8	3.7	61.4	33.5
West Coast	1,186	515.0	7.6	189.0	320.3	25,169	351	15,286	17,669	1,106	497.1	4.0	166.7	343.3
Aug. 9, 1957	8,008	3,971.0	295.4	1,725.2	1,078.3	172,973	32,554	141,999	50,138	7,995	3,922.3	313.4	1,839.0	1,091.1
Aug. 2, 1957	7,919	3,916.7	292.1	1,688.4	1,080.1	175,994	31,454	138,230	49,140	.....	.....	.....	.....	.....
Aug. 10, 1956	7,985	3,952.0	344.4	1,760.1	1,122.7	177,557	29,632	124,173	45,541	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.25-11.75
Premium (98 octane)	14.00-14.50
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	11.00-11.50
Regular (92 octane)	11.25-11.75
Premium (97 octane)	12.75-13.25
Premium (98 octane)	13.00-13.50
California (rack):	
★ Regular (88 octane)	12.9
★ Premium (96 octane)	14.9
★ Premium (98 octane)	15.4
Caribbean area (cargoes):	
Regular (87 octane)	10.875
Premium (93 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.0
Breckenridge:	
Grade 26-70	3.5

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.50-10.00
Diesel oil (58 d.i. and above)	9.125-9.75
Distillate No. 1	9.125-9.75
Distillate No. 2	8.50-9.00
Gulf Coast (cargoes):	
Kerosine 41-43	8.75-9.50
Distillate No. 2	8.75-9.50
New York Harbor (barges):	
Kerosine 41-43	10.75
Distillate No. 2	10.25
Diesel fuel, 48-52 d.i.	10.55
Caribbean area (cargoes):	
Distillate No. 2	9.00

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.85-2.10
Gulf Coast (cargoes):	
Bunker C fuel	$2.50-2.75
New York Harbor (barges):	
★ Bunker C fuel	$2.95
Caribbean (cargoes):	
Bunker C	$2.55
California (rack):	
Bunker C fuel, Los Angeles	$2.85-3.00

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	28
200 vis. neutral (180 at 100°), 25 p.t.	26

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.67	....	....	....	....
15-15.9	2.71	....	....	....	$1.89
16-16.9	2.74	....	....	....	1.94
17-17.9	2.78	....	....	....	1.99
18-18.9	2.82	....	....	....	2.04
19-19.9	2.85	....	....	....	2.09
20-20.9	2.89	$2.75	....	$2.62	2.14
21-21.9	2.93	2.77	....	2.64	2.19
22-22.9	2.97	2.79	....	2.66	2.24
23-23.9	3.01	2.81	$3.44	2.68	2.29
24-24.9	3.05	2.83	3.46	2.70	2.34
25-25.9	3.09	2.85	3.48	2.72	2.39
26-26.9	3.13	2.87	3.50	2.74	2.44
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, July 26, 1957.

Some crudes in North Central Texas and West Central Texas, are on the intermediate schedules.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.65
Middle District	4.47
Southwest Pennsylvania	4.18
West Virginia	4.00
Buckeye Grade	4.00
Zanesville Grade	3.04
Illinois Basin	3.15
Canada:	
Leduc-Woodbend	2.78
Redwater (Alta.)	2.67
Smiley (Sask.)	2.44
Pembina	2.65

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, flat, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 36.0°-36.9°, Fao	2.00
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.22
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.69
Iraq, 36.0°-36.9°, Tripoli, Banias	2.69
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (USMC—35%)	$1.85
Carib.-Canada, clean (USMC—40%)	2.43
★ Carib.-Canada, dirty (USMC—70%)	1.22
★ Carib.-Naples, dirty (Scale—30%) (24s. 9d.)	3.47

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AGGRESSIVES Sales and Service Organization handling Drilling and Production Equipment in the Ark.-La.-Tex. and Mississippi through Supply Stores. Desire to represent other manufacturers in these areas. Box K-314, The Oil and Gas Journal, Tulsa, Oklahoma.

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2—36-L BUCYRUS Spudders complete with tools. Rigs on location working. Phone 4-3641 or 2-0671, 144 Maple Street, Ashland, Ohio.

SIE, SEISMIC recording truck, shooting truck and dynamite trailer. Complete for field operation. Excellent condition. Sacrifice. UNEXCO 326A Central Bldg. Midland, Texas.

BESSEMER GAS COMPRESSORS—3 type 10 twins direct connected units—Boswell-Frates Company, 1003 Kennedy Building, Tulsa, Oklahoma.

FOR SALE—Cardwell Spudder. In good condition, both looks and operation. Complete with all tools. Priced right. K & A Drilling Co., Phone 448R, Box 497, Ellinwood, Kansas.

CARDWELL Drilling Rig R. L. Skid mounted. Working and newly overhauled. All tools, dog-house, butane tank, and so forth. Contact Homer Ellis, Box #890, Newcastle, Wyoming. Phone SHerwood 6-4562.

1 36L BUCYRUS Spudder complete with 5 and 7 inch tailing in tools. Dog house, butane tank, junk rack and light plant. Rod and tubing tools and hand tools. Phone Office 144, Res. 614, Cleveland, Oklahoma.

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SLIGHTLY USED 71 Speedstar with new Rotary attachment and Mud pump, also, straight 71 on truck, 83 Star Semi-trailer, 21 Bucyrus, 1500 Failing Rotary, and others. Star Drilling Supply Co. Manufacturers of Rotary and Cable tools, Chanute, Kansas.

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CRANES FOR SALE

1520 Unit Self Propelled Crane, 20 ton; SP-424 Lorain Self Propelled Crane, 22½ ton; 80 Pitman Truck Crane, 3 ton.
For Lease: Truck & Self Propelled Cranes, 7 to 25 ton. Equipment purchased late 1955, used very little.

H. L. PRAY MFG. Co.
Box 3335, MA 6-4840, Tulsa, Oklahoma

We Own The Equipment We Advertise.

BRILL BUYS—THE BEST!

NEAR LONGVIEW, TEXAS

FORMER LACY REFINERY

1—Wyatt 30" x 70" Stabilizer 160# 30 tray
1—5' x 96' tower, 40 tray, 135# WP.
1—2' x 50' tower, 24 trays.
1—Ethyl lead plant.
2—Upshot heaters, 10 mil. BTU/hr.
8—Welded storage tanks, 5,000, 2,000 bbl
8—Hi-vol pumps, 10 x 7 x 18, 10 x 6 x 12, 6 x 4 x 12, 6 x 3 x 8.

IN STOCK

VESSELS

2—12' x 45' Storage Tanks, 25#
1—14' x 21' Clay Tower, 125#
1—8' x 73' Tower, 20 Trays, 25#
1—18" x 32' Tower, 15 Trays, 160#
2—8½' x 25' Tanks, 50#
5—Packed Towers 14" x 40', 18" x 23', 160# Wyatt 1950.
1—Poly Reactor, 550#, 24" x 28'.

HOT-OIL PUMPS

3 Pacific ITB, 400 gpm.—2,000' hd. 735 gpm—3,100' hd.
3 Pacific SVTB, 612 gpm—600' hd. 324 gpm—480' hd, 308 gpm—516' hd, 193 gpm—389' hd.
1 Pacific HVTB (unused) 1270 GPM—408' Hd.
8J hot oil pump 3 x 9, 13 st, 325 gpm, 4600' hd.

HEAT EXCHANGERS

4—Kellogg Adm. Flty. Hd. 2200, 1300 Sq. Ft., 315#
4—Kellogg Steel Flty. Had. 800, 650, 500 Sq. Ft.
18—OR Fin Tubes, 73 Sq. Ft.
6—Brown fintube exchangers, 300# 140 Sq. Ft. 4-6 chrome
5—Steel 1,000, 980, 800, 600, 500 Sq. Ft.
6—Adm. 785, 742, 425 Sq. Ft.
30—304 SS shell & tube condensers 100-1000 Sq. Ft.

COMPRESSORS

1 Worth LTC-6 800 hp.
3 Penn Comps 100 CFM 500 lbs.
385 CFM 160 lbs.

MISCELLANEOUS

6—Bird Centrifugals 32 x 50, 24 x 38, 18 x 28.
5—Sweetland Filters No. 12, No. 10, No. 7, No. 5.
4—Rotary Vac. Filters, 10 x 12, 8 x 10, 5 x 8.
Lab Petro-Chem furnace 50,000 BTU/hr.
Tremendous selection stainless steel and steel valves 1½"-6".
Goulds 16" pump, 10,500 gpm, 135' hd.

PARTIAL LIST ONLY

WIRE! PHONE! WRITE!
FOR DETAILED CIRCULAR

BRILL EQUIPMENT COMPANY

4101 San Jacinto St., Houston 4, Texas, JA 6-1351
or
2401 Third Ave., New York 51, N. Y., CYpress 2-5703

FOR SALE EQUIPMENT

FOR SALE at Oklahoma City Warehouse, 1—used Worthington 4" x 10" power pump, figure #2424, frame size 10-H, serial #288142 fitted with 4⅞" liners, steel rods, less skid. Not separate valve pot type. Price $750.00. Cities Service Oil—Patridge—Bartlesville, Oklahoma.

Stop Tong Breakage!

ARMITE DRILL COLLAR & TOOL JOINT COMPOUND

Armite Labs., 6609 Broad. St., Los Angeles 1, Calif.
Petro. Industries Consultants, C.A. Caracas, Venez.

BOILERS

4—150 HP 350# WP LUCEY OILFIELD BOILERS
Complete with Burners, Stacks, All Connections.
Texas Operating Certificates Good Until June, 1958. Inspection Invited.
Located in Houston, Texas.

HOLMES DRILLING COMPANY
1045 SAN JACINTO BLDG.
HOUSTON, TEXAS.

BARGAIN!

1. Cooper-Bessemer Gas Compressor GMX-6. Like New, 375 hp @ 450 rpm.
2. 6 power cylinders 9¾ x 10½; 2 comp. cylinders 5¼ x 10½, 1500 PSIG WP. Provision for third comp. cylinder, if needed.
3. Complete with air starting equipment, lube oil filters & coolers, Woodward hydraulic governor, low tension, explosion proof ignition, Maxim silencer, cyl. hd. & exhaust pyrometers, pipe fittings and plumbing. Will mount on heavy duty steel skids.

   IN STOCK—PRICE F.O.B. OKLA. CITY, INCLUDING SKID, $35,000.00.
4. Can furnish and mount engine jacket water cooler and/or gas intercooler and aftercoolers to fit your application. Price on request. Other compressor cylinders available. Deduction if skids not required.

CARSON MACHINE & SUPPLY CO.
ME 8-1511 OKLA. CITY
TULSA, GREAT BEND & GARDEN CITY, KANS.

FOR SALE EQUIPMENT

LIQUIDATION— TIDEWATER OIL COMPANY
DRUMRIGHT, OKLA., MODERN 15,000 BBL./DAY REFINERY

HOUDRIFLOW CATALYTIC CRACKING UNIT, 8000 BBL./DAY (NEW 1952)

VACUUM CRUDE DISTILLATION UNIT, 15,000 BBL./DAY (NEW 1953)

HOT OIL PUMP—PACIFIC 8 STAGE CENTRIFUGAL SS LINED TYPE ITB 2½" 334 GPM @ 1000 PSI 750° F. 312 BHP

- CONDENSERS—HEAT EXCHANGERS
- NEW FURNACE & CONDENSER TUBES
- PRESSURE VESSELS
- PUMPS
- REBOILERS
- TANKS
- TOWERS
- CHEMICALS, PAINTS, DYES, WAREHOUSE SUPPLIES

Write For Complete Brochure

Heat & Power Co., Inc.
NEW YORK OFFICE—60 East 42 St., New York 17, N. Y.
TULSA OFFICE—310 Thompson Bldg., Tulsa 3, Okla., Diamond 3-4890
DRUMRIGHT OFFICE—P. O. Box 587, Drumright, Okla., Phone 569

FOR SALE near Madison, Kansas, 1—1500 barrel erected three ring high, painted, all 12 gauge flat seam bolted steel tank with stairs and walkway, new 1951, $1000.00. Cities Service Pipe Line—Patridge—Bartlesville, Oklahoma.

FOR SALE EQUIPMENT

Quantities used Seamless and Lapweld Casing & Tubing, ¾" and ¾" Sucker Rods; Pumping Units & Line Pipe, also 15,000 ft. 8⅝", 28.55# D.R. lengths, Lapweld, P.E. Line Pipe. Machine cleaned and beveled.

SABINE PIPE & SUPPLY CO.
Phones 3094-3095
P. O. Box 111, Kilgore, Texas

PRESSURE VESSELS

Two—6'9" Diameter x 93'1" long
Shell 1¼"—Heads 1½"
Code Welded—Stress Relieved
250 psi W.P.—Excellent condition
Suitable as Towers or Storage
Detailed Drawings Available
Priced to sell quick

Brown-Strauss Corporation
1548 Guinotte Kansas City, Mo.
HA 1-1000

EQUIPMENT WANTED

WANT TO BUY—Depentanizer, deisobutanizer, debutanizer, and depropanizer fractionating towers. Please furnish specifications and quote prices. Reply to Box K-285, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

AGGRESSIVE Independent Oil Company has an opening for an assistant to the district superintendent in eastern Oklahoma. Supervision of 100 producing wells and substantial drilling development. Promising future. State age and qualifications. Strictly confidential. Write Box 1100, Tulsa, Okla.

MAJOR UNIVERSITY seeks applicants for teaching positions in petroleum engineering up to and including assistant professorship—salary for the school year depending on qualifications. Opportunity for graduate and research work. Reply giving full details, age, professional experience, academic record, references. Box K-293, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF PETROLEUM ENGINEER

Required by the National Iranian Oil Company, Tehran, Iran, for taking charge of their petroleum engineering department, shortly to be formed. The applicant will be required to build up the department and supervise the petroleum engineering problems of a large oilfield recently discovered, and of another smaller field, also to advise and help on problems which may arise on any new fields which may be found either directly by the company or others acting as operators for the company.

Must have an excellent knowledge of reservoir engineering in limestone fields, with estimation of reserves and production control. Must be able to supervise a petroleum engineering and simple chemical laboratory. The successful applicant will be required to assist and train Iranian assistants.

Applicant will be based in Tehran which has a good climate and can bring out his wife and family after a period of three months from first arrival in Tehran. Contract for two years, extendable by mutual agreement. The position is one of responsibility, requiring a wide technical background, and provided the applicant is healthy and energetic an older man may be considered. Minimum experience 15 - 20 years.

In addition to a basic salary an adequate local allowance will be paid whilst the official is in Iran. Usual Oil Company leave and travel arrangements. Reply giving full details of past experience and salary to

National Iranian Oil Co.
Exploration and Production Department,
Ave. Khabir (Ave. Villa Shemali)
Tehran, Iran.

LIQUIDATION 11,000 BBL. REFINERY

D-X SUNRAY OIL CO., ALLEN, OKLA.

We are now liquidating this modern refinery and can offer equipment at a fraction of its cost.

INCLUDED ARE: 6 Heaters with Chrome Tubes, Welded Towers from 2' to 8' with Operating Pressures up to 475 psi., Reboilers, Accumulators, Heat Exchangers, Hot Oil Pumps, Centrifugal and Steam Pumps, Boilers, Gas and Diesel Generator Sets, New Chrome Heater Tubes, Pipe, Valves, etc.

Your Inspection Is Invited. Write for Catalogue.

HEAT & POWER CO. Inc., 60 E. 42 St., New York 17, N. Y.
310 Thompson Bldg., Tulsa 3, Okla.

HELP WANTED

FOREIGN EMPLOYMENT. List oil companies, drilling contractors, seismograph contractors, showing where apply foreign jobs, $5.00 cash. OIML Co., Box 2603, Tulsa, Okla.

PETROLEUM ENGINEER to work in home office engineering section. Four to seven years with two years reservoir experience desirable. Promotion to division engineer definite possibility. Salary commensurate with experience and ability. Write outlining education and experience to chief engineer. Murphy Corporation, El Dorado, Arkansas.

WANTED:
Drilling Engineer

to head up engineering department for established aggressive drilling and exploration company. Offices in New Orleans. Rigs operating offshore and on land. All inquiries will be kept confidential. Reply

Box K-308,

The Oil and Gas Journal,

Tulsa, Oklahoma.

giving experience and other pertinent data.

INSTRUMENT ENGINEERS
and
ELECTRICAL ENGINEERS

Opportunities for graduate engineers in United States and abroad.

For instrument engineers, prefer 3 to 5 years experience in application of instruments on pipe lines, refining or petro-chemicals. For electrical engineers, prefer experience in design of oil and gas pipe lines. Salary in accordance with qualifications and experience. Replies strictly confidential.

PIPE LINE TECHNOLOGISTS, INC.

P. O. Box 6957 Houston 5, Texas

SENIOR DRILLING ENGINEER

Required by the National Iranian Oil Company to take charge of the drilling section of their Production Operations Division.

The applicant who should be a qualified engineer or technician, should have had long experience of the drilling of high pressure wells from 5,000 to 15,000 feet in depth and of high capacity well completion methods. He should also be familiar with oilfield developments from high capacity high pressure producing wells and with keeping records, drawing up drilling contracts, and office routine.

The drilling operations will normally be carried out by contractors or subsidiary companies and the applicant will be required to record these activities and assure the Director responsible for Production Operations that they are being carried out efficiently and economically. A good knowledge of modern drilling machinery and equipment is essential, and sound ideas on standarization and on drilling administration is required.

The successful applicant will be based in Tehran, which has a good climate, and a married man may bring out his family after three months from first arrival in Tehran. Contract for two years, extendable by mutual agreement. The position is one of responsibility, requiring a wide technical background, and provided the applicant is healthy and energetic an older man may be considered. Minimum experience 15 - 20 years.

In addition to a basic salary an adequate local allowance will be paid whilst the official is in Iran. Usual Oil Company leave and travel arrangements. Reply giving full details of past experience and salary to

National Iranian Oil Co.

Exploration and Production Department
Ave. Khabir (Ave. Villa Shemali)
Tehran, Iran.

HELP WANTED

PETROLEUM GEOLOGIST: An independent oil company with operations in the Rocky Mountain area and Canada has a position open in Olympia, Washington, for a man with a minimum of four years experience. Must be thoroughly familiar with surface mapping techniques. Salary open. Box K-307, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMO COMPUTER—Age 21 to 26, Geological Degree with physics and math through analytical Geometry. Average grades or better. Single, or with family small enough for easy mobility. Subject to periodic moves with field party. Advancement possibilities good. Send transcript and resume of experience to The Superior Oil Company, P. O. Box 1900, Midland, Texas, Attention Mr. Reel.

WANTED
REFINERY ENGINEERS

OUTSTANDING OPPORTUNITY FOR GRADUATE, MAINTENANCE AND PROCESS ENGINEERS WITH 4 - 8 YEARS EXPERIENCE.

This well-known independent oil company offers you an outstanding opportunity to grow with their refinery technological division.

Write giving academic qualifications and employment history,

Mr. G. E. Smalley,

Hancock Oil Company,
P. O. Box 810,
Long Beach 1, California.

OVERSEAS
OPPORTUNITIES
with affiliates of
Standard Oil Company
(N. J.)
in
Mediterranean Area

DRILLING SUPERVISORS—

College degree plus several years supervisory experience.

PETROLEUM ENGINEERS—

College degree plus minimum two years experience in Drilling and Producing activities.

Liberal benefit plans and vacation. In most instances family accommodations can be obtained. Good opportunities for advancement in accordance with ability. Salary open.

— WRITE —

Giving age, complete address, marital status, education, and details of previous experience.

Box 308-P.

Radio City Station

New York 19, N. Y.

HELP WANTED

PRODUCTION ENGINEER—For position with large Independent Company operating primarily in Kansas and Oklahoma. Great Bend, Kansas location. Five to ten years experience to qualify. State qualifications and give salary requirements. Box K-294, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Large expanding independent oil company has opening for man with experience and thorough knowledge of geology in Venezuela and other Latin American countries. Age to 40. Salary commensurate with experience and ability. Headquarters in the States. Send complete personal history, including experience and education to Box K-300, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS
GEOPHYSICISTS
(South America)

Immediate openings with major oil company for graduate engineers with experience in drilling, production, reservoir and equipment; also geophysicists experienced in interpretation and supervision. Working knowledge of Spanish desirable but not essential.

Liberal Employe Benefit Plans. Salary commensurate with experience.

Forward personal data and college transcript to: Box K-249, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION ENGINEER OR SUPERINTENDENT

Required by the National Iranian Oil Company

A qualified Engineer who has had a broad experience of high pressure large capacity wells from limestone fields. Experience of multistage separators and the handling of high wax content crude an advantage. Must have had experience of the construction of production installation. The successful applicant will be required to assist and train Iranian assistants. Applicant will be based in Tehran, which has a good climate, and a married man may bring out his family after three months from first arrival in Tehran. Contract for two years, extendable by mutual agreement. The position is one of responsibility, requiring a wide technical background, and provided the applicant is healthy and energetic an older man may be considered. Minimum experience 15 - 20 years.

In addition to a basic salary an adequate local allowance will be paid whilst the official is in Iran. Usual Oil Company leave and travel arrangements. Reply giving full details of past experience and salary to

National Iranian Oil Co.

Exploration and Production Department,
Ave. Khabir (Ave. Villa Shemali)
Tehran, Iran.

UNIVERSITY OF ALBERTA

invites applications for Associate Professor of Petroleum Engineering. Appointee to participate in senior undergraduate petroleum engineering teaching, to engage in research and to aid in development of graduate program. May carry on related consulting work. Salary and academic status dependent upon qualifications. Apply in writing (enclosing photo, and details of academic qualifications, research interests and publications and practical experience) to

HEAD, DEPARTMENT OF CHEMICAL AND PETROLEUM ENGINEERING,

UNIVERSITY OF ALBERTA,

EDMONTON, ALBERTA, CANADA.

HELP WANTED

DISTRICT Production Superintendent for Creek, Okmulgee, and Hughes counties, Oklahoma. Capable of taking charge of about 135 producing wells, drilling, workovers, sandfracing, waterfloods and administrative work. Strictly confidential. Write Box K-292, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS with up to three years experience wanted by major oil company for reserve and valuation work. Permanent Tulsa location with opportunity for advancement. Replies should furnish complete personal data, education, experience and salary requirements. Box K-313, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST—Age 33, nine years major company experience in surface, operational, and general subsurface geology, mostly in a supervisory capacity. Desire position in Tulsa, Oklahoma with an aggressive independent or major. Willing to travel to areas where consulting work is needed. Venezuelan experience. Box K-290, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 8 years Oklahoma and Kansas subsurface experience with major. Masters degree. Desires change. Box K-299, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT-ADMINISTRATIVE. Degree, 31, married, 8 years contractor/producing company experience. Responsible; corporate records, financial statements, joint billings, administrative procedures, land records. Post Office Box 574, Dallas 21, Texas.

GEOLOGIST—10 years oil field experience, domestic and foreign. Very aggressive, capable and willing to relocate. Consider anything legitimate. References on request. P. O. Box 366, La Habra, California.

GEOLOGIST: Unexperienced, but willing to learn and not afraid of work. Will graduate from Texas Technological College in January 1958. Veteran, 27 years old, married. Prefer work west of the Mississippi. Box K-311, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

FOURTEEN YEARS experience in drilling, production, workover, completion. Best of references. Box K-306, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM-RESERVOIR Engineer—Age 31, M.S. Degree, Six years experience in drilling, workover, production and reservoir engineering in foreign operations. Desires state wide position. Available November 1, 1957. Box K-303, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL WELL EQUIPMENT Representative. Graduate Texas A. & M. Age 39, Registered professional engineer, petroleum. 15 years experience in oil well equipment sales, producing and drilling operations. Army Major, WW II. Native Texan, with common sense and good health. Other interests include commodity markets, corporate securities, and the Brokerage Business. Minimum salary $750 or equivalent. Available after August 15. Write Box K-304, The Oil and Gas Journal, Tulsa, Oklahoma.

WATER FLOOD ENGINEER: Petroleum graduate, 40, married. Twelve years experience planning, execution and operation of flood projects Kansas, Oklahoma, Texas. Desires connection with independent or small company. Mid-Continent. Presently employed. Box K-305, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST: Six years extensive exploratory experience in Mid-Continent and Illinois Basin. Diversified background in development and evaluation. Desires to locate Gulf Coast with progressive independent. Resume on request. Box K-307, The Oil and Gas Journal, Tulsa, Oklahoma

OIL ADMINISTRATIVE OR SALES—Desires responsible position. Age 33, nine years major oil company experience ($2\frac{1}{2}$ supervisory). Purchasing, material control, production reports, payroll, personnel, well data, budget and cost control, drilling invoices, drilling data, mineral leases, insurance, rate schedules. Eight months supervisory experience oil field construction and city sales representative. Presently employed. Box K-312, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST. Over ten years with major companies in oil exploration Texas Gulf Coast, Oklahoma, Southeastern States, Arkansas, West Texas-New Mexico and East Texas. Capable conducting regional subsurface studies. Two years Land Department experience. Desires re-locate. Box K-310, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

OFFERING CHOICE ROYALTIES. You can now make very small investments on income Royalties or those ahead of drilling. A. S. Berry, 520 Wright Bldg., Tulsa, Okla.

WE WILL BUY your producing Royalties, Overrides, Oil and Gas Producing Properties. Ben H. Williams—Clarendon, Texas. Wiltex Oil Company.

LEASE AND DRILLING BLOCKS

TWO OLD shallow leases, can be reconditioned profitably. Carl Johnson, Half Way, Ky.

LEASE FOR SALE: Chautauqua county, near Sedan, Kansas. 16 wells, production from Peru sand. 1250 ft. deep. 9 producing. 4 on pumping units, balance on rod lines. B. B. Jamison, Madison, Kansas. Phone 80 W.

OIL AND GAS MINERAL LEASES available in Dell City area of Hudspeth County, Texas. U. S. Geological Survey Map shows anticlinal axis nearby favorable for oil-gas structure. Am fee landowner of over 2000 acres. Write quickly to: Jefferson G. Smith, 215 Littlefield Building, Austin 15, Texas.

OIL LEASES IN BOOMING

4-Corners Area. November Indian Lease sale brought 30 Million Dollars. Some leases sold for $3,200 per acre. Wells estimated up to 1500 barrels of oil per day. Oil Leases from $2.25 an acre. Fortunes being made. Write for free information now. ATLAS OIL SURVEY, Dept. OJ-7, Colorado Bldg., Denver 2, Colo.

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OIL PROPERTY VALUATION

by PAUL PAINE, a consulting engineer with many years' experience in the oil production business

— because it covers such subjects as:

Oil properties and oil property interests . . . with definitions, examples, lists of required data, and a useful table giving the products of customary fractions used in dividing oil-property interests.

Unproved lands . . . including measures of value, the lease, selection rights, royalty, etc.

Oil and gas reserves . . . with definitions of terms, descriptions of methods . . . and all the working details.

Elements in valuation . . . including marketing the gas; costs for acquisition, development, operations, taxes and overhead; and many other topics.

Valuation methods . . . explains the classic "engineering method" in detail with excellent examples of data compilations; describes other methods based on the time to pay out, the average daily barrels of oil production, the well itself, and the barrels in the ground; remarks on valuation compiled for the lender of money, on royalties, and on fair market value.

The examination and report . . . gives practical directions on how to go about a job, the examination of accounts, and the preparation of a report.

204 pages
$5.50

for sale by

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THE OIL AND GAS JOURNAL

BOX 1260 • TULSA 1, OKLA.

WANTED

WANTED: Oil Royalty, Gas Royalty, and working interests Texas, Oklahoma. A'Mell Oil Properties, 1201 Elm, Dallas, Texas. RIverside 1-9251.

BOOK WANTED: Will pay $10 for copy A.A.P.G. 1954 "Western Canada Sedimentary Basin." O. D. Sherfy, 608 Santa Fe St., Waynoka, Oklahoma.

PRODUCTION FOR SALE

FOR SALE: Shallow oil and gas production comprising forty wells, average depth 850 feet, approximately 500 acres low volume production, good for secondary recovery. For details write Uhl Oil and Gas Company, New Matamoras, Ohio.

CAN DELIVER 1,000 to 5,000 bbls. crude oil daily, low grade or regular in tank cars or in pipe line at Wyoming points. Producer, P. O. Box 2362, Denver, Colorado.

PRODUCTION WANTED

PRODUCING oil, gas properties, also royalties wanted. Any size, any amount. Complete details in first letter. Box 231, Scarsdale, N. Y.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

ELECTRIC LOG CABINETS

FOR ECONOMICAL FILING of full-size electric logs, most geologists prefer Kraftbilt E-24 4-drawer cabinet. Two compartments to each drawer with separate follow blocks make this cabinet handy, economical. For filing reduced electric logs, geologists use Kraftbilt E-28 8-drawer cabinet. Send for catalog 57-B. Ross-Martin Co., P. O. Box 800-A, Tulsa, Okla.

REAL ESTATE

WAREHOUSE BUILDING FOR SALE: One story ALLIED STEEL WAREHOUSE BUILDING, 36 x 120, at New Castle, Wyoming. Four years old. Has heating, plumbing, living quarters. Building is on leased property. Write or phone MID-CONTINENT SUPPLY COMPANY, 1100 Denver Club Bldg., Denver, Colorado.

BUSINESS OPPORTUNITIES

FINANCIAL CONTACTS. Underwriters, Brokers, Private Finders of Capital reached. No shopping. Confidential. FREE ENTERPRISE ASSOCIATES, 817 51st St., Brooklyn, N. Y.

PARTNER TO FINANCE DEVELOPMENT of 600 acres proven Northeastern Oklahoma secondary recovery project. Partner receives tax benefits of development costs and depletion plus full return of investment prior to division of profits. Total investment million dollars; estimated return nine to twenty million.
Box K-301, The Oil and Gas Journal, Tulsa, Oklahoma.

FUNDS and PERSONNEL
available for installation of Gas Compression or Injection Plant on proven property. Installation would be completed without producer financial participation and leased for operation. Might consider part ownership.
Box K-302, The Oil and Gas Journal, Tulsa, Oklahoma.

LEGAL

SEALED BIDS will be received until 2:00 P.M., Mountain Standard Time, August 28, 1957 and opened at that time in the Office of the Superintendent, Blackfeet Indian Agency, Browning, Montana, for the leasing of 9,673.27 acres of Tribal land and 1,509.15 acres of allotted Indian land located in Townships 31 North, Range 5 West; 32 North, Range 5 West; 34 North, 6 West; 36 North, Range 8 West; 36 North, Range 9 West and 37 North, Range 6 West, Glacier County, Montana, for oil and gas leasing purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of the Blackfeet Indian Agency, at Browning, Montana.

Pipeline Patrol

(Continued from page 253)

Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.).

Project: 625 miles of 12-in. from Mendoza to San Lorenzo.

Status: Planned.

Foreign Products Pipelines

- **Empresa Nacional de Petroleos** (Government of Chile) and **Cia. de Petroleos de Chile (Copec), et al.**

Project: 75 miles of 10-in. from Chile's coastal refinery at Concon to Santiago.

Status: To start work September 1957.

Contractor: **Williams Brothers**

Completion: Early 1958.

- **Israeli Government**

Project: A 6-in. line from the Haifa refinery to Tel Aviv.

Completion: Late 1957.

- **Mene Grande Oil Co.**

Project: 60 miles of 6-in. L.P.G. line from Anaco to Puerto La Cruz, Venezuela.

Status: Planned.

Completion: Fourth quarter 1957.

- **North Atlantic Treaty Organization**

Project: 2,000 miles of lines to airfields in parts of Europe.

Status: Under way.

Contractor: **Associated Pipeline Contractors, Inc.** (450 miles from Iskenderun, Turkey to Batman); **TECHINT** (205 miles of 4-in. from Bandirma to Eskisehir, Turkey, and 250 miles of 8-in. from Antalya to Eskisehir).

Foreign Natural-Gas Pipelines

- **Andes Pipeline Corp.** (Glenn McCarthy, Inc).

Project: 500 miles of 12-in. from McCarthy's Bolivian concession to the Chile copper-mining area.

Status: Proposed.

Contractor: Will do own work.

- **Attock Oil Co.**

Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.

Status: Planned.

- **Cia. Shell de Venezuela.**

Project: 177 miles of 20-in. from La Paz field in the Maracaibo district, to the Cardon refinery on Paraguana Peninsula.

Status: Under way.

Contractor: **Williams Brothers Co.**

Completion: 1957.

- **Gaz de France**

Project: 550 miles of 16 to 24-in. from Lacq field, southwestern France, to Paris, plus a 10-in. lateral to Nantes and 12 to 16-in. laterals to Lyons, making a 1,000-mile system.

Status: Right-of-way work under way.

Contractor: French contractors.

Completion: First stage in 1958; complete system in 1960.

- **Petroleos Mexicanos**

Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.

- **Sui Gas Transmission Co.**

Project: 217 miles of 16-in. from Sui gas field to Moultan, Pakistan.

Status: Under way; to be extended later to Lahore with branches at Kot Addu, Jhang Magiana, and Montgomery.

Contractors: **Pakistan Constructors,** a joint company of **Morrison-Knudsen** of Boise, Idaho, and **William Press, Ltd.,** of London.

Project: 145-mile line from Sylhet to Dacca, East Pakistan.

Status: Under consideration. If approved construction could start December 1958.

- **Technical Office of Hydrocarbon, Ministry of Mines and Petroleum, Government of Venezuela.**

Project: 207 miles of 26-in. from Anaco fields to Caracas.

Status: Under way.

Contractor: **Fulghum Contracting Corp.** will be consultants; **Petrogas, S. A.** will engineer and construct the line.

Completion: Spring 1959.

- **Union of Soviet Socialist Republic.**

Project: 808 miles of 26-in. from Stavropol in the Northern Caucasus to Moscow, to serve Voroshilovgrad, Voronezh, Tula, Yelets, and Serpukhov.

- **Yacimientos Petroliferos Fiscales (Argentina)**

Project: 1,015 miles of 24-in. from Camp Duran to Buenos Aires.

Status: Planned.

Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.).

EQUIPMENT MEN...

Bucyrus-Erie Names Nevada, California Distributor

Sanford Tractor & Equipment Co., Reno, Nev., has been appointed a distributor for Bucyrus-Erie Co. in western and central Nevada and northeastern California.

The Reno firm now offers sales and service on Bucyrus-Erie's full line of ⅜ to 4-cu.-yd. convertible excavators and cranes; 15, 25, and 35-ton capacity Transit cranes; 5-ton and 10-ton truck-mounted, all-hydraulic Hydrocranes; and dragline buckets.

Klemp Appoints Hughart As General Manager

Gerald T. Hughart has been appointed general manager of Klemp Metal Grating Corp. Hughart comes to Klemp from Stearns-Roger Manufacturing Co., Denver, where he served as manager of manufacturing and sales engineer in charge of process equipment sales. Prior to this he was with General Motors 7 years.

The Klemp Corp., which is located in Chicago, also has a plant in Houston, offices in New York City, and agents in principal cities in the United States, Canada and South America.

Pioneer Specialties Names President and Secretary

Ronald Nelson has been named president and treasurer of Pioneer Specialties, Inc., and A. G. Chaudoir has been appointed secretary.

Nelson has been with the company since 1955. Chaudoir joined Pioneer in 1954, shortly after the firm's organization. The firm manufactures slush pump pistons, piston pullers, liner pullers and chain anvils.

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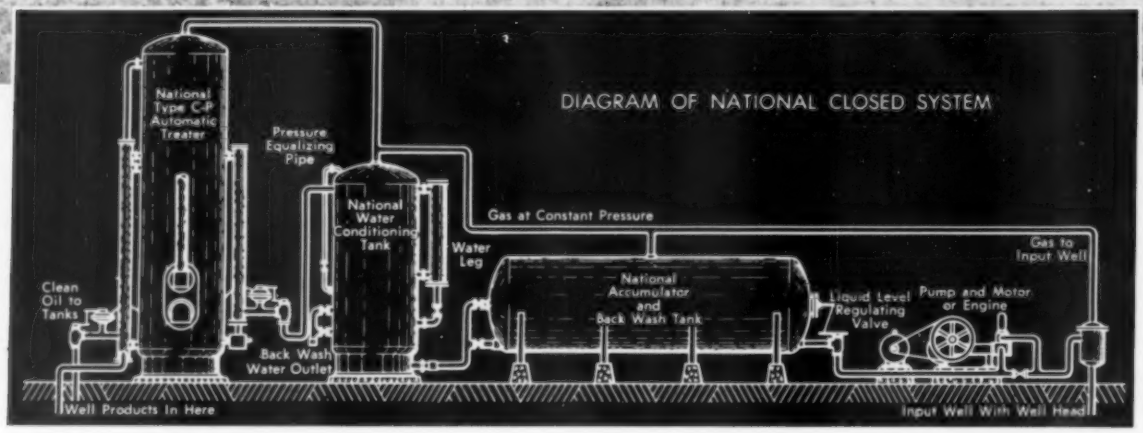
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